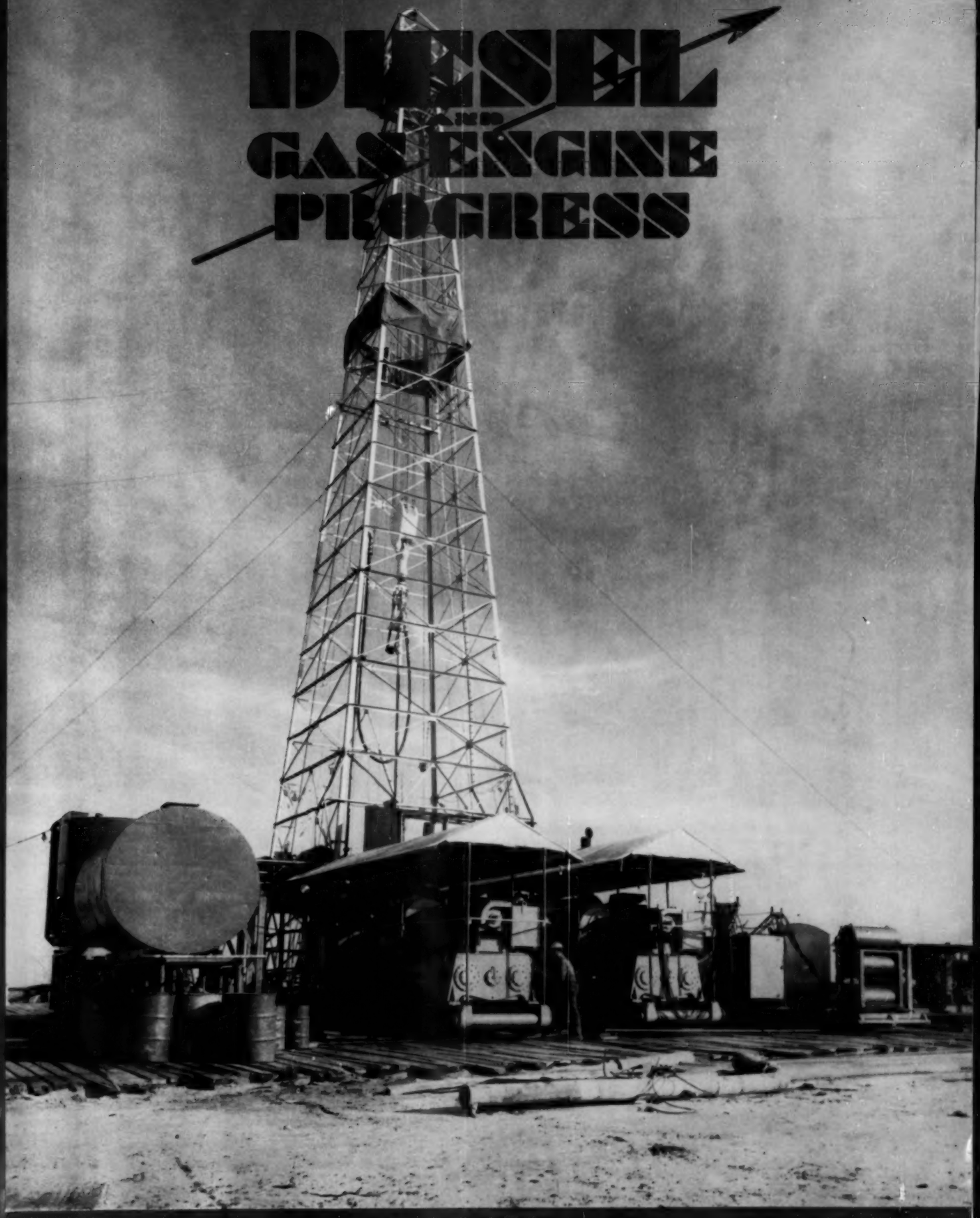
DIESEL AND GAS ENGINE PROGRESS

DIESEL ENGINES • DUAL FUEL ENGINES • NATURAL GAS ENGINES • GAS TURBINES



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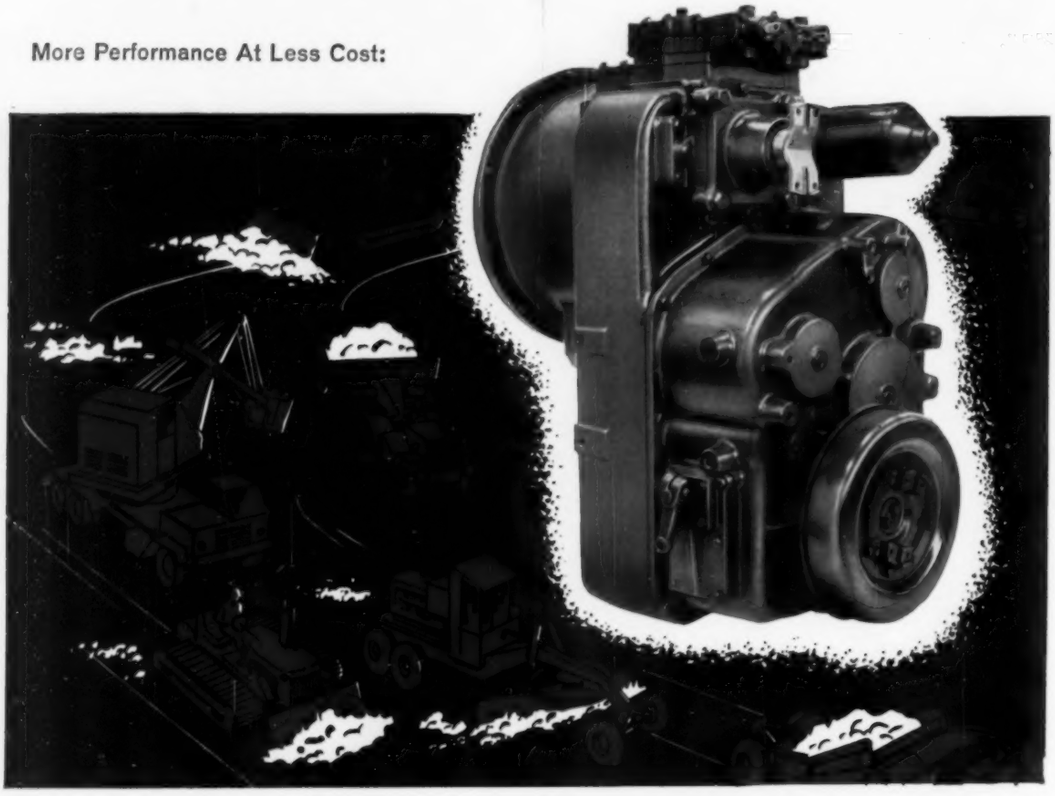


HYDRA-DRIVES®
CDB POWER SHIFT TRANSMISSION

A torque converter...and 4-speed transmission in one compact package!

Proved in hundreds of vehicles for four years, these units assure top work output of heavy-duty equipment . . . at a lower initial cost than other models of comparable performance. Engine lugging and heavy shock loads are eliminated. A 3 to 1 torque multiplication makes starting fast and effortless – even with heaviest loads.

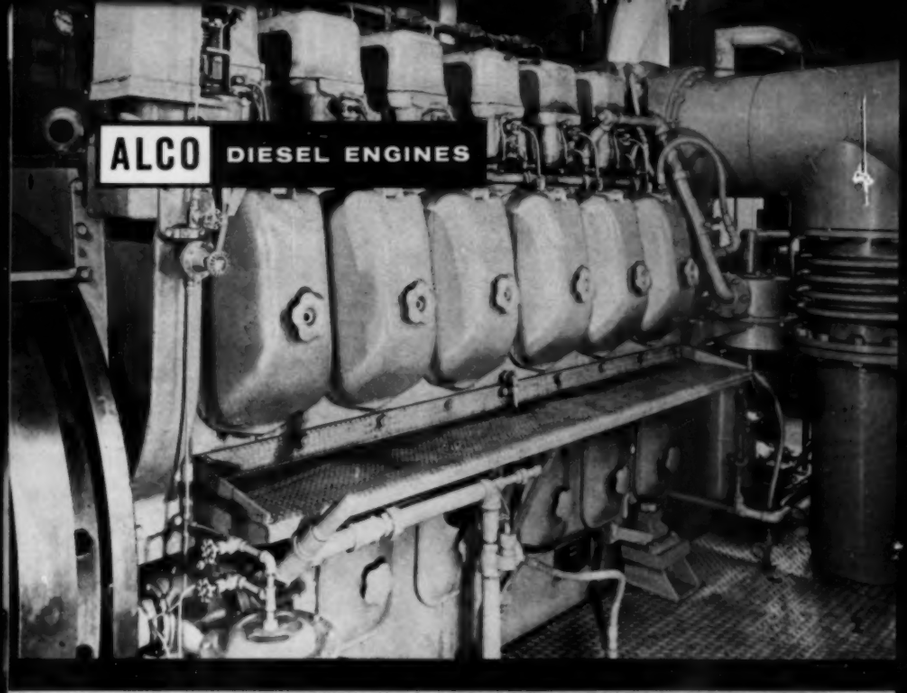
Simple to operate, too, a flip of the operator's lever accomplishes power shifts within each range and without any interruption of the power flow.

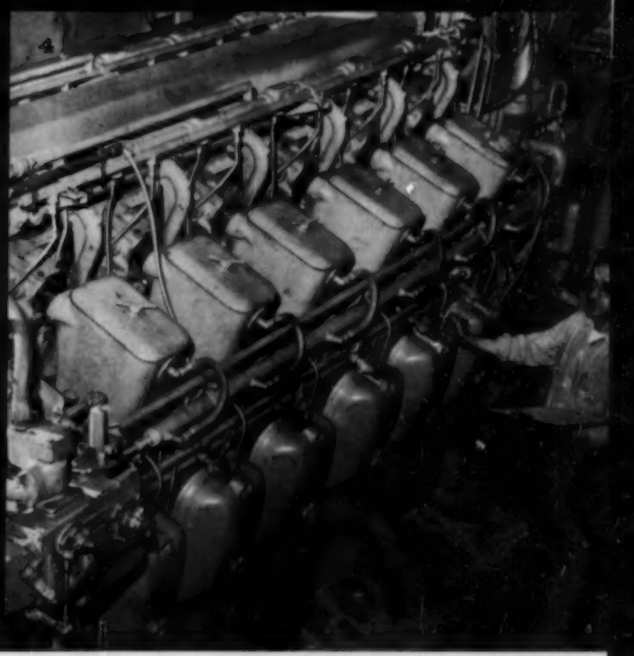
With four speeds forward and reverse, the CDB Hydra-Drives Power Shift Transmission is ideally suited for vehicles which must travel in both directions during a normal work cycle. Rated at 550 ft. lbs. input torque, it can be used with a wide range of internal combustion engines up to 250 H.P.

The CDB model illustrated above is used in connection with a size "C" drop box. A BDB model is also available, for use with a size "B" drop box on equipment of up to 175 H.P.

HYDRA DRIVES
ROCKWELL-STANDARD CORPORATION
TRANSMISSION AND AXLE DIVISION
DETROIT 32, MICHIGAN

Products of **ROCKWELL-STANDARD** Corporation





THE NEW BIG MUSCLE IN DIESELS

Around the world—in all kinds of tough diesel-power jobs—ALCO's 251 diesel engine has proved that it delivers the versatility, economy and stamina needed for profitable operations. Here are a few examples:

1. Microwave signals from 100 miles away direct an ALCO six-cyl 251, pumping liquid petroleum products on a Kansas pipeline. After two years of remote operation—8000 total hours—an inspection revealed the engine could run at least twice as long without overhaul.

2. Three 251's power a large offshore drilling platform. The operator reports that fuel consumption is much lower than competitive engines, while the 251's controllability allows him to speed up costly drilling operations.

3. Tugboats like the *Savannah* use 16-cyl 251's to get power for heavy tows on high seas. Operators report low maintenance, with three to four years' operation before overhaul. The 251's fuel consumption—15 per cent less than competition—permits longer tows.

4. A steel company uses an ALCO 251 as standby, pumping cooling water to open hearths. Recently, during a power stoppage, the 251 assumed the whole pumping load, saving thousands of dollars of furnace damage.

ALCO 251's—available in inline six, vee 12 and 16, from 900 to 2400 hp—are your best investment. For more information, call your ALCO sales office, or write: ALCO Products, Inc., Dept. 1201, Schenectady, N. Y.

ALCO PRODUCTS, INC., New York · Sales Offices in Principal Cities · Makers of: *Diesel Engines Weldments · Locomotives · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Oil Field Equipment*

ALCO

General Motors Reliability in Action...

Mechanical Blizzard!

Harrison Heat Exchangers —Reliable Products of General Motors Research and Engineering.

HARRISON COOLS OIL FOR DIESEL-POWERED SNOW MACHINE THAT PRODUCES 10-INCH SNOWFALL IN AN HOUR

Snow is made to order for perfect skiing all winter long at Mt. Christie in Michigan. Water and compressed air are mingled and distributed as a fine spray through a series of sprinkler heads. By this method a 24,000 sq. ft. area can be covered with a ten-inch snowfall in an hour! And this Diesel-powered snow machine counts on Harrison heat exchangers to control vital operating temperatures. That's because Harrison, with a half century of experience in the heat control field, builds reliability into every product. So, if you have a cooling problem, rely on Harrison for the answer.

GM HARRISON

TEMPERATURES MADE TO ORDER

AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

DIESEL AND GAS ENGINE PROGRESS

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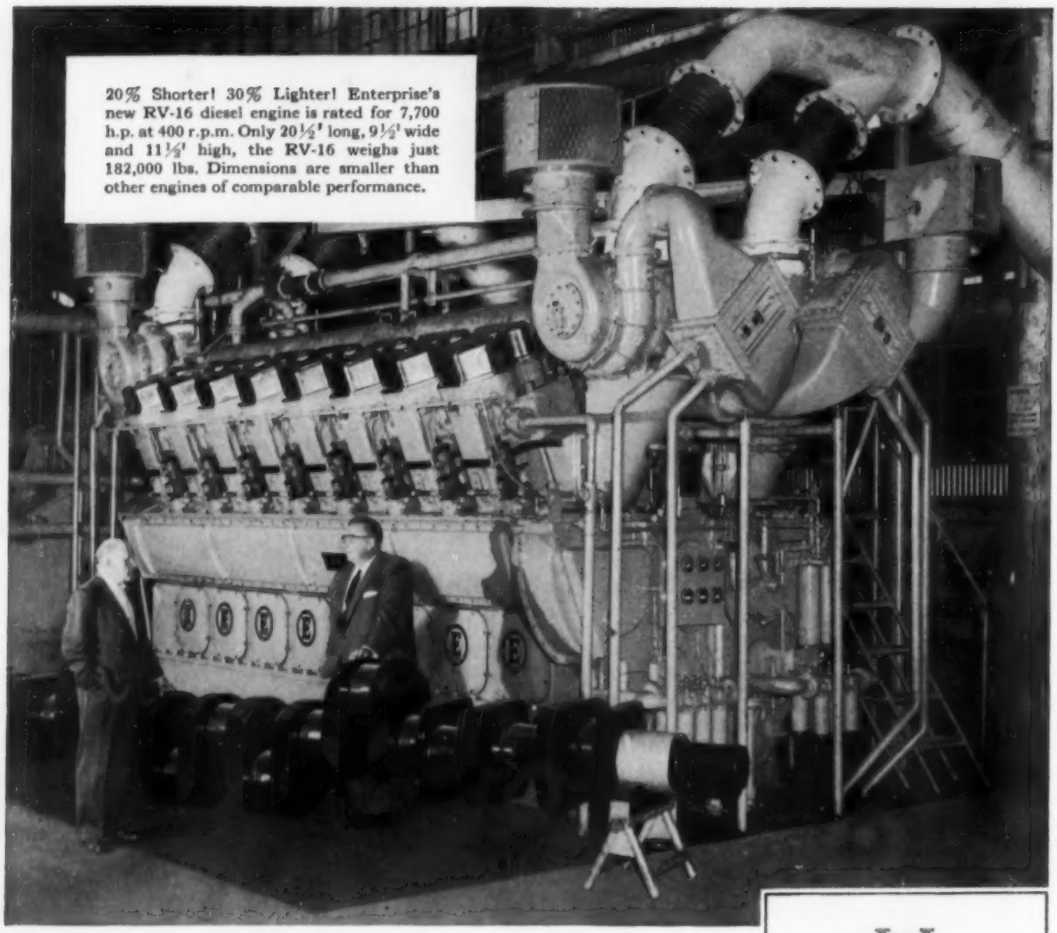
FRONT COVER ILLUSTRATION

Gray Wolf Drilling Co. converted an old steam rig to diesel-electric, cut rig-up time nearly 35 percent. Two Electromotive diesel-electric sets supply power to drive motors on mud and sand pits pumps, draw-works.



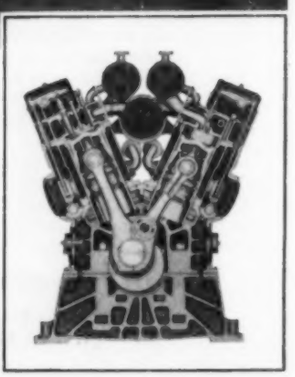
20% Shorter! 30% Lighter! Enterprise's new RV-16 diesel engine is rated for 7,700 h.p. at 400 r.p.m. Only 20½' long, 9½' wide and 11½' high, the RV-16 weighs just 182,000 lbs. Dimensions are smaller than other engines of comparable performance.

Enterprise Chooses KOPPERS Piston Rings Exclusively for RV-16

Prototype of a new line of industrial diesel engines, the RV-16, built by Enterprise Engine & Machinery Co., of San Francisco, is designed for such rugged operations as delivering main propulsion in towboats and seagoing freighters, or supplying power for pumping stations or electric generation.

As many other leading manufacturers have done, Enterprise has selected Koppers Piston Rings exclusively. Koppers wide range of types and sizes . . . variety of material selection . . . control of material quality . . . close tolerance performance . . . rigid standards of inspection—all contribute to Koppers leadership in the field of industrial piston and sealing rings, making Koppers the most dependable source of supply.

If you have a problem of ring application, avoid further needless expense. Take advantage of Koppers experience, research facilities and craftsmanship. Write for information today. KOPPERS COMPANY, INC., Piston Ring and Seal Department, 4201 Hamburg Street, Baltimore 3, Maryland.



Cutaway shows internal design of the RV-16

KOPPERS

AMERICAN HAMMERED
Industrial Piston Rings
Engineered Products Sold with **Service**

BARBER-GREENE specifies INTERNATIONAL Power

for world's leading line of asphalt plants!

Report from Guy Banister,
Chief Technical Engineer,
Barber-Greene Co., Aurora, Ill.

"We standardized on International diesels for Barber-Greene Continuous Mix Asphalt Plants in 1947, and owners' reports prove we made an excellent choice."

"For 30 years Barber-Greene Continuous Plants have played a major role in making asphalt paving the world's most used road surface. Since the 30's road builders have been able to produce a controlled high-quality mix in high volume at low cost, and that calls for *efficient power.*

"Because the whole paving operation depends on our plants for asphalt production, plant downtime can run as high as $5,000 hourly. And since engines on the plants operate under continuous load 8 to 10 hours daily—that calls for *dependable power.*

"Since Barber-Greene Continuous Mix Plants are highly mobile—often moving to 6 or 8 jobs in a season—that calls for engines supported by an *excellent parts and service organization.*

"International diesel engines meet Barber-Greene standards for efficiency, dependability, and parts and service support. That's why we standardized on IH power for these plants. Performance records over the past 13 years show that our customers, too, are satisfied International users."

You, too, can build into your products the advantages of International power. Check the complete International engine line—32 carbureted and diesel models from 16.8 to 385 max. hp. You'll like the one common feature of all 32 engines: fastest payback power for users. Just call or write International Harvester Co., Engine Sales Department, Construction Equipment Division, Melrose Park, Ill.

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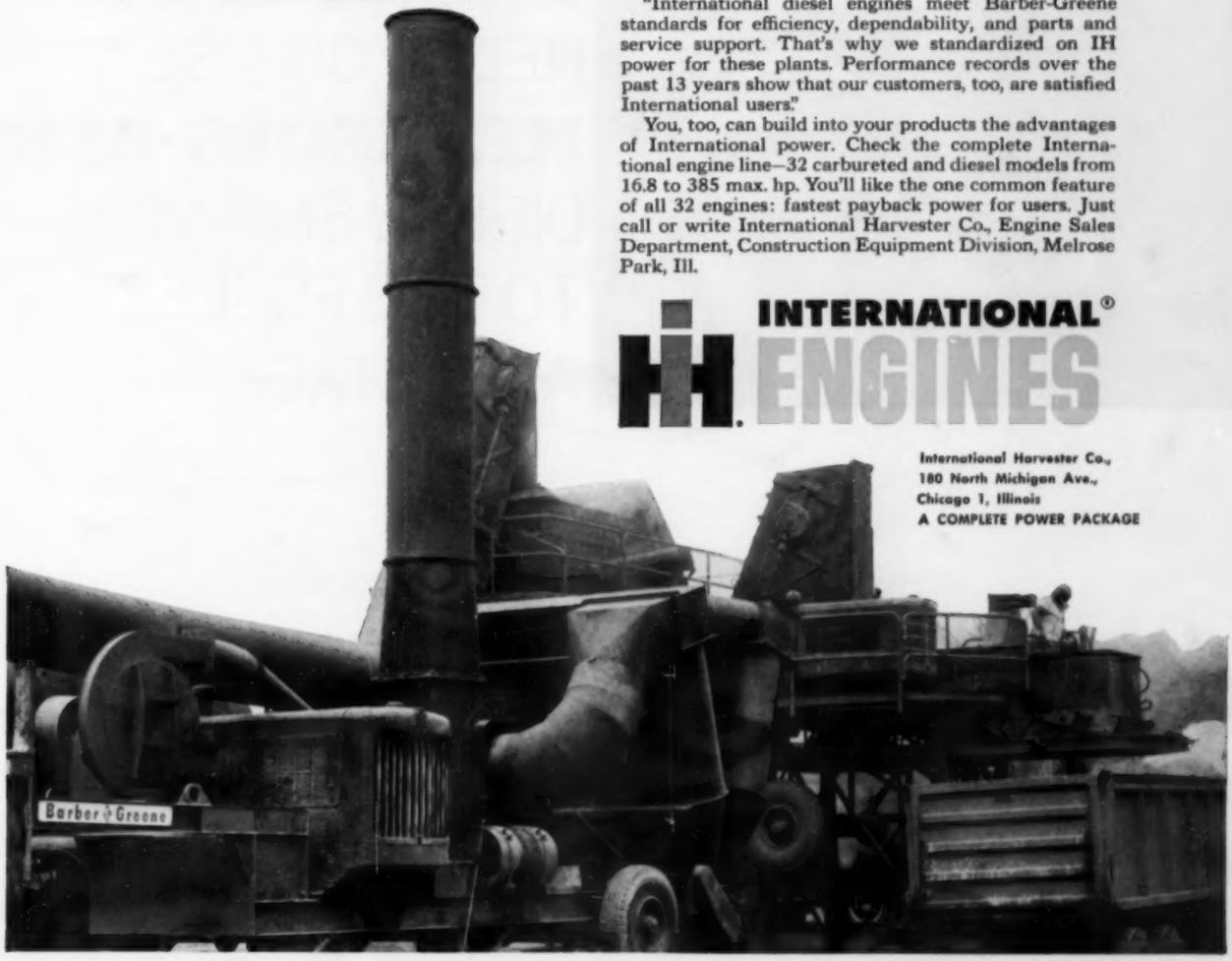
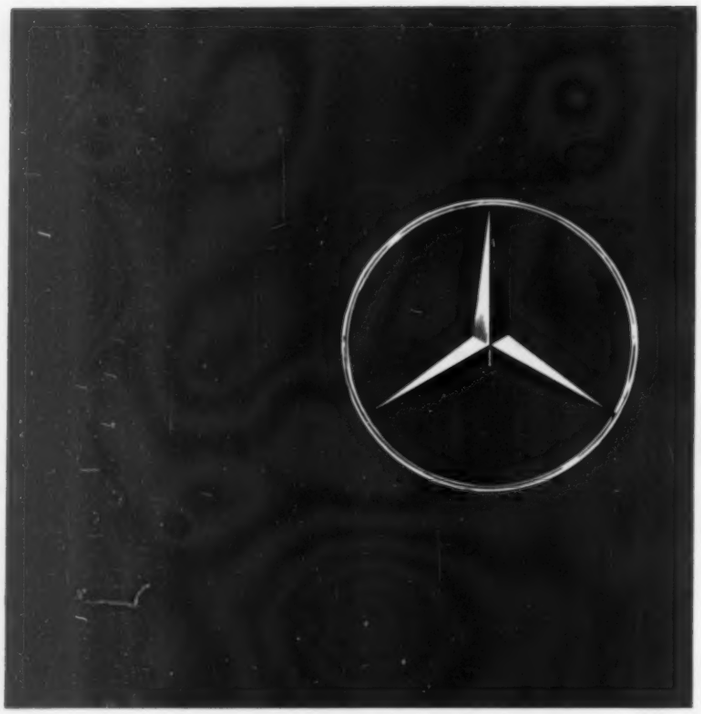
IH ENGINES

International Harvester Co.,
180 North Michigan Ave.,
Chicago 1, Illinois
A COMPLETE POWER PACKAGE





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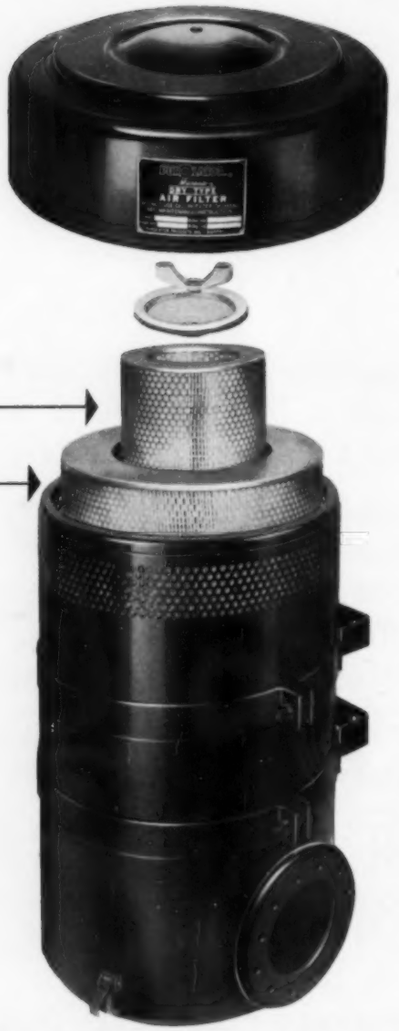

an element here

and an element here

assures 99.98% filtration efficiency even when 1 element is out of operation

IT'S THE NEW PUROLATOR TWO-STAGE FILTER

The air that enters a diesel engine is always 99.98% free of dust and dirt, even if one filter element is completely out of operation, because Purolator's *new* two-stage filter has two filtering elements telescoped in a single shell. Each element filters independently of the other, and together they dust-proof the engines you build as no other filter can.

Users appreciate the way the two-stage design protects the engine despite accidental mishandling of the element.

Even if the first stage element is damaged, the chance of harming the engine can be discounted when your diesel is protected with the second stage back stop element. In addition, the second stage element enables the operator to service the unit in the field regardless of how dusty the conditions are.

Exhaustive field tests have proven that the first stage element of this new Purolator filter will last anywhere from 600 to 2000 hours, depending on operating conditions. Generally, the second stage will last almost indefinitely if the first element and sealing gaskets are maintained in top form.

Both elements filter uniformly, in depth, over their entire surface. This series of two stage air filters is rated from 450 to 1150 cfm, with exceptionally low initial restriction.

For further information on the new Purolator two-stage filter just mail the coupon below.

Purolator Products, Inc.
Dept. 3095, Rahway, New Jersey

Please send me complete data on the new Purolator two-stage filter series.

Name_____ Title_____

Company_____

Address_____

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Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, CANADA

SPICER RUBBER ELEMENT SHAFTS CAN HELP YOU SOLVE YOUR TORSIONAL RESONANCE PROBLEMS

If you are faced with the problem of torsional vibration from impulses within the operating range, Dana engineers may be able to help you solve your design problems.

Spicer resilient propeller shaft assemblies have been used successfully for years in rapid transit cars, street cars, engine dynamometer, truck, bus, earthmover and passenger car applications to solve difficult torsional problems.

Spicer rubber-cushioned shafts make it possible for design engineers to "tune out" the vibration and thus produce commercially acceptable installations.

Spicer rubber-cushioned propeller shafts offer these additional advantages:

1. The torsional flexibility limits the effect of high impact loads resulting from rough shifts and other sudden torque changes.
2. The cushioning effect prevents clatter, rattle, and backlash noises.
3. Increased life of bearings, gear teeth, splines, and other components due to the reduction of high impact and torsional loads.
4. Reduction of noise transfer.
5. Axial flexibility to cushion forces resulting from length changes.

Product knowledge and years of experience are available to you through Dana engineers to help solve your torsional problems. Contact them today.

International 295 Payscraper, equipped with a Spicer rubber element shaft, at work on the Interstate Highway System.

DANA Spicer **DANA CORPORATION**

Toledo 1, Ohio

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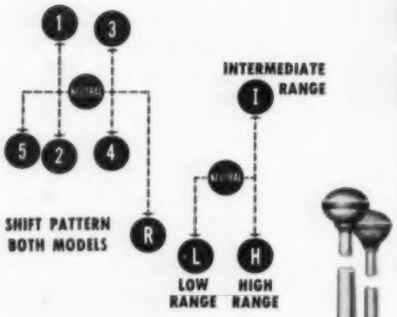
Many of these products are manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

NEW Fuller Heavy-Duty

10 closely-spaced gear splits plus deep reduction ratios



MODEL 15-G-1120

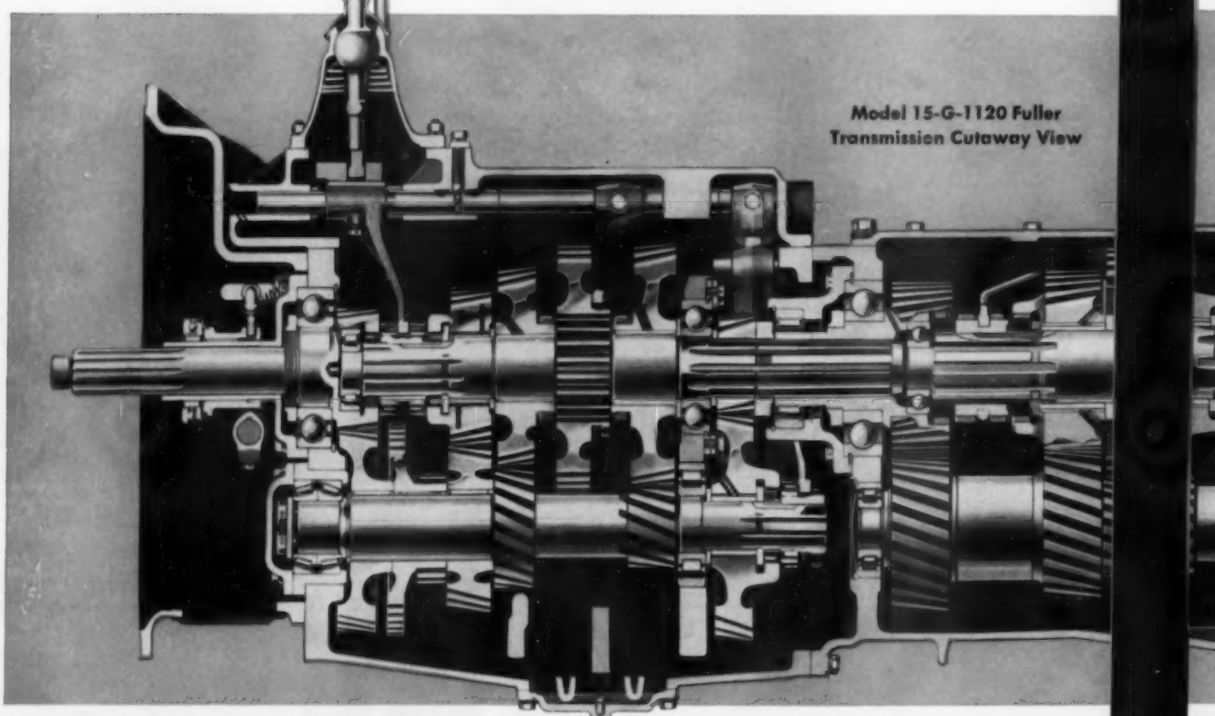
MODEL 15-H-1120

Fuller now offers two new 15-speed transmissions engineered for on and off-highway diesel truck operations demanding high capacity, long wear life and ease of operation . . . for logging, mining, construction, oil-field work, aggregates and ready-mix.

Advantages of the new transmissions include:

1. Extremely short installation dimension, which permits shorter wheelbase for tractors which formerly incorporated main and auxiliary transmissions.

2. Maximum operational flexibility with not only 10 closely-spaced gear splits, but also 5 speeds avail-



Model 15-G-1120 Fuller Transmission Cutaway View

FULLER TRANSMISSION DIVISION MANUFACTURING COMPANY KALAMAZOO, MICHIGAN

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Automotive Products Company, Ltd., Automotive House, Great Portland Street, London W.1, England, European Representative

15-SPEED TRANSMISSIONS

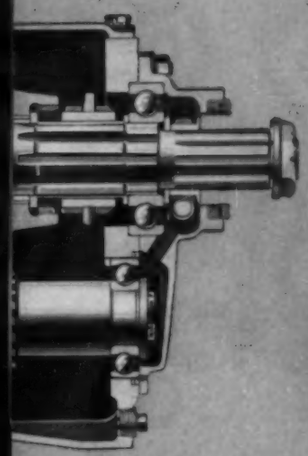
designed for combination on and off-highway applications

able for low range operation through a deep reduction in the auxiliary.

3. A wide choice of optional gear ratios to match every job requirement.

4. Weight reduction obtained by eliminating support brackets, joints, cross members and a propeller shaft.

For full details on the Fuller 15-G-1120 and 15-H-1120 Transmissions, ask your dealer or write Fuller Manufacturing Company.



Model 15-G-1120: Standard Gear Ratios

SPLITS—OVER-HIGHWAY				LOW RANGE—OFF-HIGHWAY		
Speed	Split	Ratio	% Step	Speed	Ratio	% Step
10th	O'Drive-High	.636		5th-Low	1.33	
			33			57
9th	O'Drive-Int.	.844				
			19	4th-Low	2.09	
8th	Direct-High	1.00				76
			33			
7th	Direct-Int.	1.327				
			32	3rd-Low	3.68	
6th	3rd-High	1.76				86
			33			
5th	3rd-Int.	2.32				
			41	2nd-Low	6.83	
4th	2nd-High	3.27				100
			33			
3rd	2nd-Int.	4.33				
			51	1st-Low	13.67	
2nd	1st-High	6.54				
			33			
1st	1st-Int.	8.68				

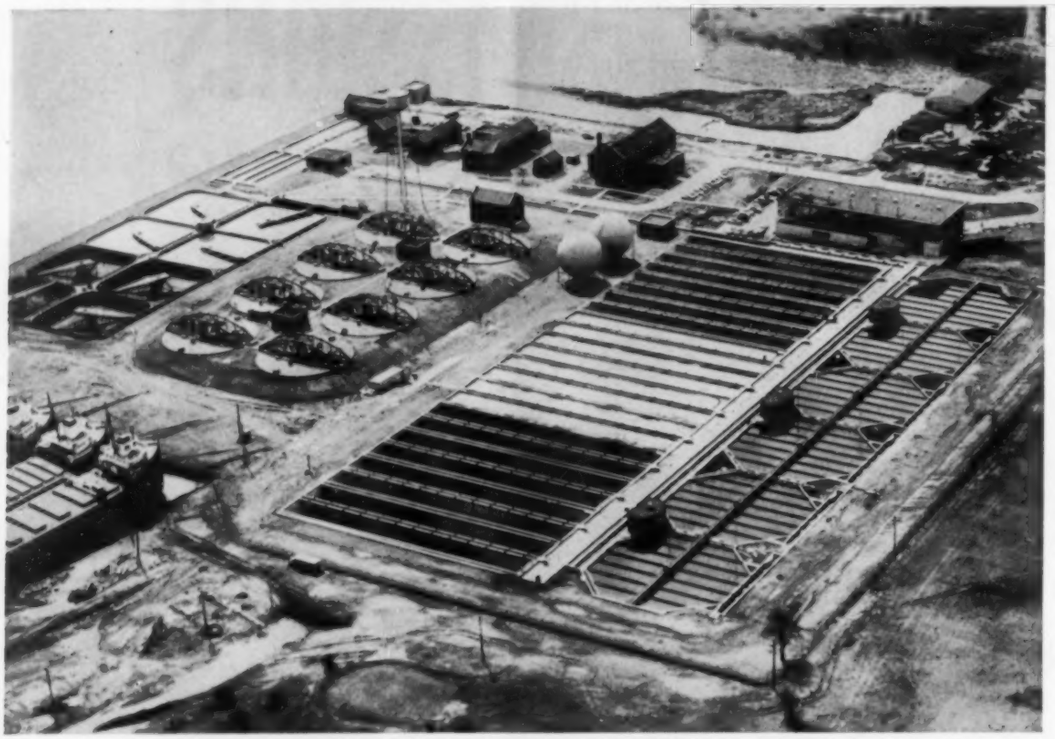
Model 15-H-1120: Standard Gear Ratios

SPLITS—OVER-HIGHWAY				LOW RANGE—OFF-HIGHWAY		
Speed	Split	Ratio	% Step	Speed	Ratio	% Step
10th	O'Drive-High	.636		5th-Low	1.68	
			33			57
9th	O'Drive-Int.	.844				
			19	4th-Low	2.64	
8th	Direct-High	1.00				76
			33			
7th	Direct-Int.	1.327				
			32	3rd-Low	4.65	
6th	3rd-High	1.76				86
			33			
5th	3rd-Int.	2.32				
			41	2nd-Low	8.63	
4th	2nd-High	3.27				100
			33			
3rd	2nd-Int.	4.33				
			51	1st-Low	17.27	
2nd	1st-High	6.54				
			33			
1st	1st-Int.	8.68				

Optional Gear Ratios: Models 15-G-1120, 15-H-1120

Overdrive: .85, optional at extra cost
Overdrive: .74
Reverse: 5.06

Subsidiary of EATON Manufacturing Company



Aerial view of the Toledo disposal plant. Primary facilities built in 1932 are at left and the new secondary facilities are at right. Round tanks in center store sewage gas used to operate engines.

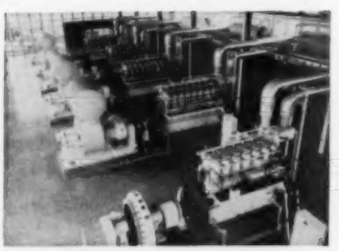
TOLEDO SOLVES POLLUTION PROBLEM . . . THANKS, IN PART, TO BENDIX FUEL INJECTION

For many years the City of Toledo has been discharging its sewage into the Maumee River. While this solved its sewage problem, it created an even greater one of pollution. To lick this threat to health and sanitation, Toledo recently completed a $9,500,000 secondary sewage plant. Now, sewage pumped into the Maumee is as pure, if not purer, than the river water!

Power for the principal equipment of the new facilities is provided by five Enterprise Model G Tri-fuel Engines—equipped with dependable Bendix* fuel injection. These engines are designed to operate on diesel fuel, natural gas or sewage gas or a mixture of these. Through means of a calor-optic unit the BTU content of the sewage gas is raised by mixing with natural gas. Use of sewage gas for fuel results in an annual saving of $50,000!

With sewage disposal, as with any other application involving low-cost combustion power, Bendix is the right choice for fuel injection. That's the reason so many diesel manufacturers specify Bendix. Why don't you?

*REG. U.S. PAT. OFF.



Here are the five Bendix-equipped Enterprise Tri-fuel Engines. Four drive blowers provide air for sewage separation tanks. Engine in foreground powers generator for emergency electrical power.

Scintilla Division
Sidney, New York

Export Sales & Service: Bendix International Division, 205 E. 42nd St., New York 17, N.Y.

Sludge in engine ends with switch to STANODIESEL Oil M

Situation: For five years a 1,400 hp. engine in the Municipal Light Plant, Arcadia, Wisconsin, was operated on STANODIESEL Oil M. During this time the engine ran free and clean. It carried a major share of the plant's 20,000 kw. output. A decision was made to switch the engine to another lubricant since it was believed one oil was as good as another.

What happened: Within two years the engine had sludged up so much, the oil had to be removed and replaced by STANODIESEL Oil M. Three months later the engine had cleaned up and was again carrying its share of the plant's load.

Clean engine operation is possible with STANODIESEL Oil M because of its superior base stock and its combination of additives that are available in no other oil. Superior base stock and exclusive additives give you these cost-saving operating and maintenance advantages: less sludging, low oil consumption, reduced port deposits, fewer stuck rings, less need for ring replacements, less cylinder wear, lower filtration costs, fewer bearing problems.

Get more facts about STANODIESEL Oil M. Call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*

The team that got the engine back in shape; (l. to r.) Vernon Schwertel, Ronald Darbo and Standard's Fred Parkinson. Providing lubrication technical service on problems like this one is not new to Fred Parkinson. He's been doing it for 11 years. He has further qualification for such work—an engineering degree from Brown University. Fred has also completed the Standard Oil Sales Engineering School.

Quick facts about STANODIESEL Oil M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by economy fuels.
- Maintains film on difficult-to-lubricate parts.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.

$5-Million Diesel Contract For Army's Zeus Program

A contract for approximately $5-million has been awarded the Cooper-Bessemer Corp. for the supply of 11 highly specialized 1500 kw diesel engine generator sets, complete with the associated mechanical, electrical and control equipment by the United States Army Corps of Engineers for the Army's Zeus program. The Cooper-Bessemer LSB-12-T diesel engines being supplied, will develop 2120 hp at 327 rpm and will be directly connected to 1500 kw generators. The power generated will provide the electrical energy for the new Zeus "anti-missile" program. The Zeus is designed to seek out, identify, and destroy enemy intercontinental ballistic missiles in flight. To accomplish this, the voltage and frequency fluctuation of the generating units must be kept to an absolute minimum. The units will undergo three separate critical tests. Prior to being built the complete electrical system will be simulated on an analog computer to assure that all components which affect the quality of the electrical energy are completely compatible with the precise power specifications as issued by the Government. The computer program is further complicated by the fact that several units will be installed in a single plant. This means that the plant as an entity must be analyzed. While such an analysis has been performed previously on smaller installations, this is believed to be the first time a dynamic analysis will have been undertaken on such a large complete diesel engine-generating plant. The other two tests will be to prove conclusively that the actual operation of the units is in accordance with the design criteria. One of the tests will be performed in the factory and one in the field. The factory test will be unique in that the engines and generators will be assembled at the builder's plant and exhaustively tested at their full rated output. The field test will be a complete additional check of the equipment to insure that the "as installed" equipment and systems are in complete accordance with the specifications. The equipment will be built and tested at Cooper-Bessemer's Grove City, Penn., plant. Four of the units will be installed at the Army's White Sands Missile Range, New Mexico, and seven will be shipped to Kwajalein Island in the fall of 1960 for installation there.

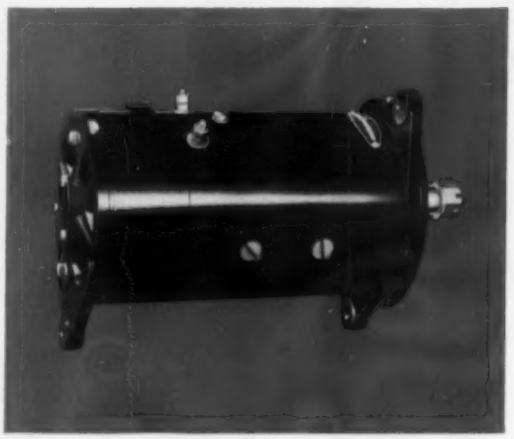
"Condec" New Designation

What do you do when your name is Consolidated Diesel Electric Corp. but neither "diesel" nor "electric" describes the full range of your products? Answer: you change your corporate nickname from Con Diesel to *The Condec Group*, "Condec" being a telescoping of the original title. Reason for the rechristening is that Con Diesel . . . oops, Condec . . . manufactures valves, electronic apparatus, motors and hydraulic, pneumatic and nuclear controls, among other items. It includes under one corporate roof, in addition to the parent company, Consolidated Avionics Corp., Consolidated Controls Corp., Hammond Valve Corp., and Lima Electric Motor Co.

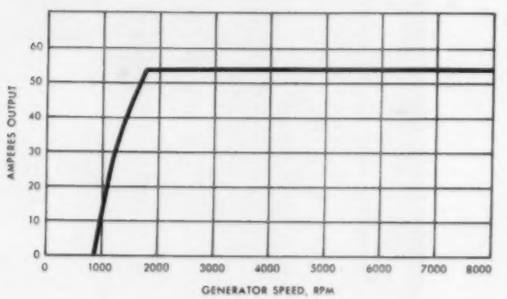
New Aeroquip Distributors

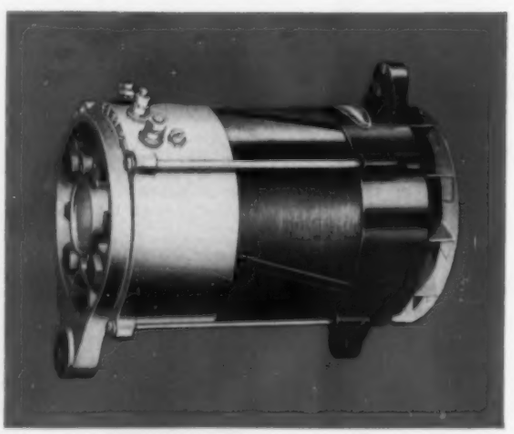
W. A. Lucht, manager of distributor sales, has announced appointment of the following new industrial distributors for Aeroquip Corp., Jackson, Mich.: Moorman Equipment Company, Cedar Rapids, Iowa; Cummins Diesel Sales Corp., Tampa, Fla.; L. E. Fox Co., Inc., Kansas City, Mo.; Central Supply Company, Inc., West Monroe, La.; Geheb Electric & Industrial Supply Co., Muskogee, Okla.; Southern Supply Company, Jackson, Tenn.; Hoener Equipment Company, Quincy, Ill. and CKM Industries, Cincinnati, O. Aeroquip produces flexible hose assemblies; detachable, reusable fittings; self-sealing couplings; bands; straps; load control and cargo tie-down equipment.

TAILOR YOUR TRUCKS

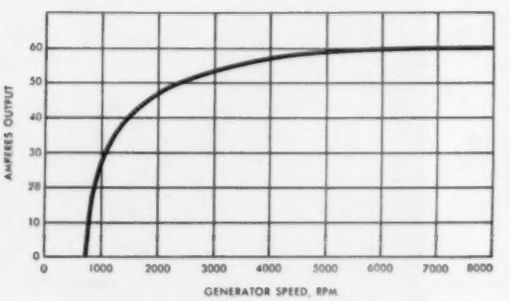


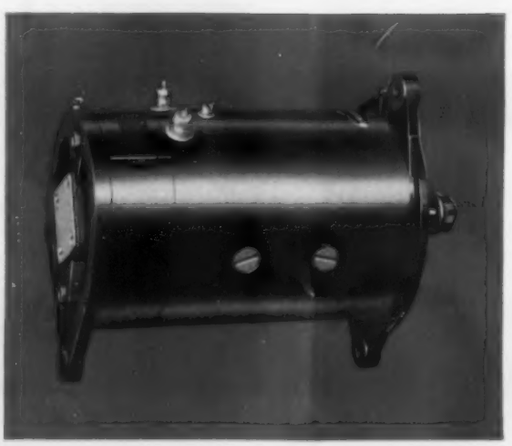
1106991 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 55 amperes • 12 amperes at idle—For cross-country trucks, school buses and other vehicles with extra electrical equipment.



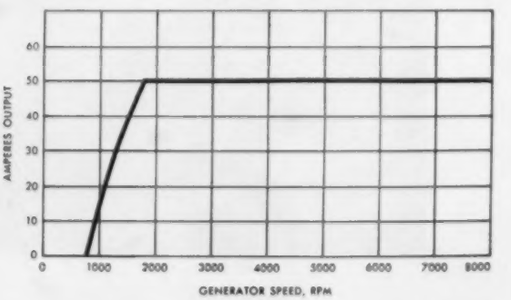


1117070 SELF-RECTIFYING A.C. GENERATOR—12 volts • 60 amperes • 27 amperes at idle—For high-duty vehicles with heavy electrical loads . . . operating at all speed ranges. Ideal for excessive low-speed operation and curb-idling.





1106985 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 50 amperes • 14 amperes at idle—Short frame generator for difficult mounting applications. For vehicles in city and suburban use. Not for cross-country operation.



Move Office

Waukesha Motor Co.'s Los Angeles branch headquarters has been moved into its new building in Huntington Park, Calif. Effective immediately, the correct address for correspondence to the Pacific Coast branch will be: Waukesha Motor Co., 5608 Soto St., Huntington Park, Calif. Waukesha will no longer have offices located at the former address in Los Angeles, nor at Watts, California.

Pilot Boat Contract

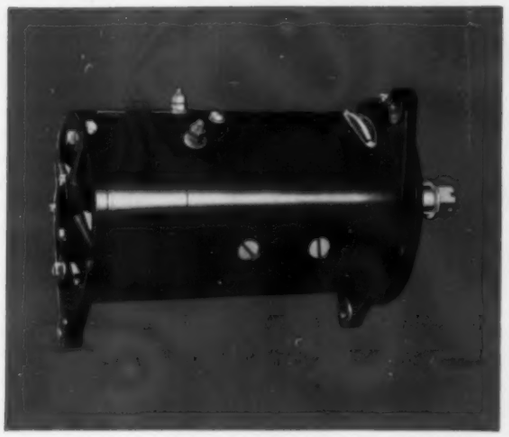
Gladding-Hearn Shipbuilding Corp., Somerset, Mass., has been awarded a contract by the Charleston Pilots' Association for the design and construction of a 60′ steel pilot boarding boat. Design is based on the lines of the successful launches *Brandywine, Cape Henlopen* and *Narrows* previously built by Gladding-Hearn for the Delaware and the New York-New Jersey associations. The new craft will be powered by a GM 12V-71 diesel rated 335 hp @ 1800 rpm, driving a 44 in. three-blade propeller through a 2:1 hydraulic reduction gear and 3 in. monel shaft.

New Coal Handling Blade

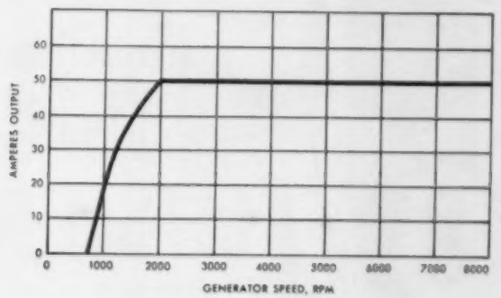
The LeTourneau-Westinghouse Co., of Peoria, Ill., has announced the availability of a new coal handling blade for use with the model C Tournatractor. The new blade will handle approximately 50 percent more material than the conventional dozer blade, L-W says. The "U" Blade measures 15 ft. from end bit and it is 4½ ft. high. This is three feet wider and a little over a foot higher than the conventional blade. The Tournatractor is a 218 hp rubber tired tractor capable of speeds to 17 mph. The Tournatractor is available with either a Cummins HBIS-600 or GM 6-71 diesel engine. The Cummins unit is rated 210 hp at 1800 rpm while the 6-71 is rated 218 hp at 2100 rpm. Both are six cylinder engines. The four cycle HBIS has bore and stroke of 4⅛ in. x 6 in.; the two cycle GM engine has bore of 4¼ in. and stroke of 5 in. Transmission is a power shift type, air-actuated LeTourneau-Westinghouse 7-C with torque converter. The "U" Blade is an optional accessory for the Tournatractor and it can be factory installed or customer installed. In a straight line comparison between the "U" Blade and the conventional blade, L-W says the "U" can push between 6 and 12 tons as compared with 4 to 7 tons with the conventional dozer blade over the same distance.

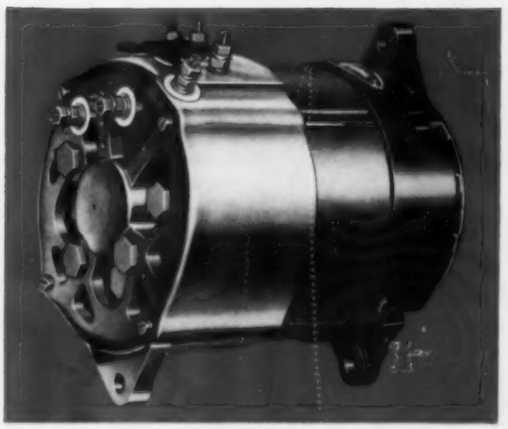
ITS NEW

TO JOB CONDITIONS

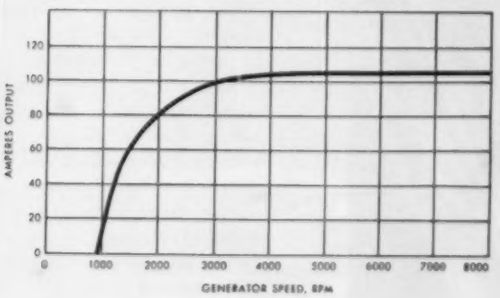


1106986 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 50 amperes • 20 amperes at idle—For metropolitan trucks and school buses, with extra electrical equipment . . . operating at low speeds and with engine idling most of the time.





1117115 SELF-RECTIFYING A.C. GENERATOR—12 volts • 105 amperes • 10 amperes at idle—For high-duty vehicles with extra-heavy electrical loads . . . operating at all speeds. A.C. voltage available for 110 V conversion.



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Demands on the electrical systems of trucks vary with their use. For best performance, whether the vehicles be new or already in service, the electrical equipment should be job-matched to meet those demands.

Do your trucks have extra electrical equipment? Operate cross-country, around town or off the road? Do they travel at sustained highway speeds, or with plenty of stop and go? Whatever their assignment, there are Delco-Remy extra-output generators and regulators job-matched to meet the electric power needs *exactly*.

Delco-Remy ELECTRICAL SYSTEMS

GM GENERAL MOTORS

FROM THE HIGHWAY TO THE STARS
DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Tulsa New F-M Oil Sales Headquarters; New District Head

William G. Vollendorf has been appointed manager of the Tulsa (Okla.) sales district, of Fairbanks, Morse & Co. Mr. Vollendorf succeeds Kirke K. Wyatt, who has been promoted to manager of petroleum industry sales. Tulsa is to remain the headquarters for Wyatt. The petroleum industry sales headquarters formerly were in Dallas. Mr. Vollendorf, a major in the Air Force reserve went to work for Fairbanks-Morse in 1942 and returned to Fairbanks-Morse after World War II service in 1948. He returned to active service in the Air Force for the Berlin Airlift and remained in service until 1954, when he resumed his career at Fairbanks-Morse. Mr. Wyatt has been with Fairbanks-Morse since 1945, when he became an application engineer at the company's pump works in Pomona, California.

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Industrial Air—Needs Brochure

A new 16-page brochure on compressed air for industrial requirements has been published by The Cooper-Bessemer Corp. The publication contains detailed discussion of construction features on the company's new DMR line of industrial air compressors ranging from 100 to 400 hp ratings, in one, two and three stage units. Cut-away drawings of each unit are included. There is also analysis of the characteristics of separate component parts in the compressors, as well as Cooper-Bessemer En-Tronic Controls for the regulation of air compressor operations. Bulletin No. 94, "Economical Air for Industrial Needs" may be obtained from the Cooper-Bessemer Corp., Mount Vernon, Ohio. (ITS NEW)

NEW
ACTUALLY 3 SPRINGS IN ONE!
As shown in this enlargement, the tri-coil spring is composed of 3 integrated coils. The spring's amazing strength and durability are the result of this triple-coil design.

HEAVY-DUTY OIL RING WITH

TRI-COIL OFFSET SPRING

solves tough oil control problems—
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Exclusive new Perfect Circle tri-coil spring has maximum area of contact with the ring all the way around—provides more uniform pressure than an ordinary hump-type expander. This results in higher cylinder conformability with less friction.

And, the stainless steel spring is offset in a channel next to the ring slots, rather than being directly behind them. Ventilation is greatly increased, and clogging of the ring and spring is reduced to a minimum.

Heat stability and easy installation are two more of the many more outstanding features of the new Perfect Circle OS 89. Get complete information from your Perfect Circle representative today!

PERFECT CIRCLE

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POWER SERVICE PRODUCTS • SPEEDOSTAT

Hagerstown, Indiana — Don Mills, Ontario, Canada

Versatile Multifuel Diesel Outperforms Gasoline Truck

The Army Transportation Corps reports superior performance of a versatile, multifuel diesel engine for a truck, burning anything from Army gasoline to kerosene or marine diesel fuel, in competition with a standard gasoline engine. The final Army evaluation report of the road tests has been published by the office of technical services, business and defense services administration, U.S. Department of Commerce. The Transportation corps used two "M-48" standard two-and-a-half ton Army tractors in the tests. One truck employed conventional gasoline power; the competing M-48 was identical except for replacement of the gasoline engine by a heavier multifuel diesel installation. Army gasoline, JP-4 fuel, kerosene, standard diesel and marine diesel fuels were successively burned by the diesel rig. The control M-48 could burn only gasoline. The Army indicates that, when utilizing any one of these five representative, common fuels, the new multifuel diesel plant demonstrated "a significantly lower fuel consumption rate than the standard gasoline engine." Operating on kerosene or either grade of diesel fuel, the contrast was even more pronounced. On these three less refined products, the multifuel diesel "greatly outperforms the standard M-48 truck." Only on the more highly refined JP-4 fuel or gasoline under freezing conditions did the diesel encounter difficulty. The warm-up was speeded, however, by priming the air-intake-manifold heater. The Army indicated that minor thermostatic and priming adjustments might eliminate even the cold weather limitations satisfactorily. The illustrated report, PB 161114, *Multifuel-Diesel-Engine Truck*, J. T. Gurganious and R. L. Berriker, Transportation Corps, U.S. Army, 29 pages, July 1959, may be ordered from OTS, U.S. Department of Commerce, Washington 25, D.C., at $1.

Natural Gas Engines Booklet

Caterpillar natural gas engines for all applications are described in a new 8-page booklet. The booklet traces the development of the natural gas engine at Caterpillar; shows model views, specifications and fuel consumption curves of current models. The booklet contains photographs and job stories illustrating actual performance of Cat natural gas engines in drill rig, cotton gin, irrigation, gas compressor, pipeline, air conditioning, sewage disposal, gas separation, electric, standby and other installations. For a copy of this booklet, write Industrial Engine Plant, Caterpillar Tractor Co., Peoria, Ill., and ask for booklet 20173. (ITS NEW)

Initial mailing May 15th.

Your **1960 DIESEL AND GAS ENGINE CATALOG**

still only

$10.

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2 **TURBOCHARGERS and SUPERCHARGERS** — This section of manufacturers is detailed and fully illustrated to give complete information on this increasingly important phase of the industry.

3 **TRANSMISSIONS** — The latest information on torque converters, fluid drives, and other modern means of transmitting power are fully described and illustrated in this section.

4 **ACCESSORY EQUIPMENT** — Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.

5 **ADVERTISING** — Leading manufacturers of engines, accessories and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.

6 **PLUS A LARGE GAS TURBINE SECTION**

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Nugent & Co., Inc., Wm. W.

Perkins Limited, F.
Pioneer Motor Bearing Co.
Poyaud (Societe Grossel)

Precision Mecanique Labinal
Purolator Products, Inc.

Rockwell-Standard Corp., Transmission & Axle Div.
Rolls-Royce Limited
Roots-Connersville Blower Div.
Roper Hydraulics, Inc.

Schoonmaker Co., Inc., A.G.
Schwitzer Corporation
Scintilla Div. of Bendix Aviation Corp.
Sheppard Co., Inc. R. H.
S.I.G.M.A.
Simms Motor Units Limited
Sinclair Refining Co.
Snow-Nabstedt Gear Corp., The
Solar Aircraft Company
Standard Oil Co. of California
Standard Oil Co. (Indiana)
Stewart & Stevenson Services, Inc.
Stratoflex, Inc.
Sulzer Brothers Limited

Thomas Flexible Coupling Co.
Thompson-Ramo-Wooldridge, Inc.
Twin Disc Clutch Co.

Union Diesel Engine Co., The

Voss Co., Inc., J. H. H.

Wade Engineering
Waukesha Motor Company
Western Gear Corporation
Westinghouse Electric Corp.
White Diesel Engine Division, The White Motor Company
Wichita Clutch Co., Inc.
Winslow Engineering & Mfg. Co.
Woodward Governor Company
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Yates-American Machine Co.
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Don't miss the exciting announcement inside!

The size and format of Volume 25 of this "Bible of the Industry" will be the same as in previous years—a big 450 page book with easy to read page size of 10½" x 13½". The large, wide open format makes reference simple and quick. Each section is fully illustrated with photographs, power curves, specifications, charts, and sectional views, as well as full description in the text of the products and their fields of application.

The Catalog never outlives its usefulness because engines and equipment described in it are built to last for years. Order your copy of Volume 25, now! The pre-publication demand and the press-run of Volume 25 is larger than ever before in the history of **DIESEL AND GAS ENGINE CATALOG.** You cannot afford to be without it in your business. Be sure of your copy as soon as the Catalog is off the press, by ordering without delay.

DETACH FROM ADHESIVE STRIP — THEN USE THE COUPON

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To the Employee Relations Director of every American company

LET'S FACE IT . . . the threat of war and the atom bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, may strike without warning.

The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

Ry M. Vadman

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Small Turbine Contract

A Navy contract for 286 small gas turbine engines has been received by the AiResearch Manufacturing division, The Garrett Corp., Phoenix, Ariz. The turbines are for fleet use in providing pneumatic starts for operational Navy jets. The 130 lbs./min. bleed units will be installed in both air transportable pods, and in enclosures mounted on Navy Hough tractors. Delivery on the new turbine order started in February.

94 International DCOF-405's

Ruan Transport Co., large midwestern bulk liquid hauler, is taking delivery of 94 model DCOF-405 International road tractors, representing an order of approximately $2,000,000. Rated at 76,800 lbs. gcw, the six-wheel units will serve as fleet replacements and will allow increased payload capacities, according to John Ruan, president of the company. The 155 in. wheel base Internationals are equipped with 54-in. cabs, Cummins NH-220 diesel engines, lightweight aluminum components including aluminum frames and rear wheels, air ride suspension, and air starters.

F-M diesels cut municipal power fuel cost 43% in Thibodaux, La.!

Town Powers All New Municipal Plant with 3 F-M Engines. Saves Nearly $50,000 In First Year!

This Thibodaux, La. installation says the F-M quality-and-economy story better than the best chosen words.

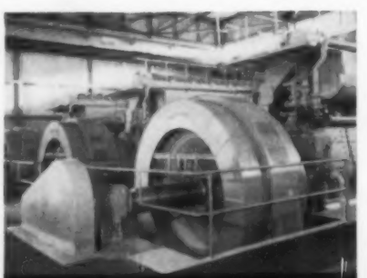
Three Fairbanks, Morse Dual-Fuel Diesels produced greater power—more efficiently—at substantial savings! 43% savings, in fact.

These F-M 2-cycle engines achieved a reduction in gas and fuel oil costs of 2.53 mills per kwh! With these 3 engines generating a total of 19,522,000 kwh during 1958, the town's Municipal Utilities System saved close to $50,000!

Thibodaux chose F-M 2-cycle Dual-Fuel engines because of their simplicity, low-speed, long engine life . . . and their built-to-last quality.

F-M engines saved (and are still saving) Thibodaux money.

They'll save *you* money, too.



Thibodaux's three 8-cylinder, 18x27-inch, 2800 hp, 2000-kw Model 31AD18 Dual-Fuel F-M engines, operating at 277 rpm.

Fairbanks, Morse

DIESEL DIVISION • BELOIT, WISCONSIN

A MAJOR INDUSTRIAL COMPONENT OF FAIRBANKS WHITNEY CORPORATION, NEW YORK

West Coast News

By James Joseph

DELIVERED to Republic Van & Storage Co., Los Angeles, a 1960 Dodge "900", powered by a Cummins 195 hp engine to pull Republic's new 40 ft. rubber-spring-riding utility trailer, especially designed for electronic equipment haulage.

TO Belyea Truck Co., ten new Cummins NH 250 diesels with 4-speed Spicer boxes and three-speed auxiliary transmissions for Autocar tractors—to haul cement on Arizona's big Glen Canyon dam project.

LOS Angeles' Angelus Engine Sales has been appointed by the Marine and Industrial Engine Division of Chrysler as engine center for sales of Deutz diesels in California.

INSTALLED: in the purse seiner *Seven Seas,* owned by the Duvich brothers, and working out of San Pedro, Calif., a Volvo MD-67, rated 115 hp at 2500 rpm, as auxiliary engine.

SOLD to Santa Monica (Calif.) Sport Fishing Co. for its boat *Indiana,* a Lister-Blackstone SL-2, 8½ hp at 1800 rpm for powering pumps.

NEW San Leandro (Calif.) service manager for Caterpillar dealer Peterson Tractor Co. is Raymond Gieszl. Charles Welch has been upped to San Leandro parts manager, with a new assistant, William Hamilton.

TO Alhambra, Calif.'s Vinnell Co., four Murphy diesel electric sets (with Electric Machinery generators) rated 110 kw at 1200 rpm, 240-480 volts, 60-cycle, to power rock crushers and camp lighting on Pakistan construction project. Sale by Industrial Engine Service, Los Angeles.

SOLD to San Pedro, Calif.'s State Fish Co., five Lister-Blackstone SL-ls (4¼ hp at 1800) to power 3 kw fish-bait lighting generators. Sale by Bolstad Sales and Service, San Pedro.

O and K Bait Co., San Pedro, has taken delivery of three SL-1 Lister-Blackstones to power fish-bait lights. Owner is Paul Froude.

TO Pacific Intermountain Express, 40 (of 75 on order) Cummins NH 220 engines to power fleet of new Peterbilt cab-over-engine 352-ST tractors. Sale by Cummins Service and Sales, Los Angeles.

TWO Deutz A6L614 diesels (air-cooled and rated 100 hp at 1800 rpm) were

purchased recently by an Arizona contractor to power a Mixermobile scoopmobile and a shaker. Sale announced by Diesel Energy Corp.

ARNOLD Hermansen, Hawthorne, Calif. has taken delivery of a Volvo MD-1 (5 hp at 2000 rpm) as auxiliary for his sailboat. Sale by Advance Fuel Systems, Long Beach, Calif.

AN MD-96 Volvo, 150 hp at 1800 rpm, has gone to L. C. Houk to power a pump on his Sandy Valley ranch near Las Vegas, Nevada. Engine works thru a Twin-Disc drive.

SOLD to Brookside Vineyard Co., Guasti, Calif., an M. A. N. diesel tractor model 4L-1, 28 hp, the engine two-cylindered and water-cooled. Sale by M. A. N. Pacific, Wilmington, Calif.

FOR Pacific Fruit Express' new mechanical refrigerated car program, 700 Witte Model 100RDA, 12½ kw diesel engine-generator sets. PFE is building 1000 new reefer cars in all.

TO G. Davidge, Santa Ynez Valley Hardware, Solvang, Calif., a Volvo D-1 (5 hp at 2000 rpm), as an auxiliary work engine.

ON Richfield Oil Corp's man-built one-acre off-shore Rincon drilling island (off Rincon, Calif.), two 600 hp GM twin diesels power a National 50 draw works, the unit scheduled to drill some 68 wells on the island.

SOME 44 American MARC 7½ kw generators, powered by American's AC-2, air-cooled diesels (14 hp at 1800 rpm) have been ordered to support a Navy missile program.

DELIVERED to Worthington Corp., for a missile support program: eight American MARC 12 kw generators driven by Hercules DD-226 diesel engines (36 hp at 1800 rpm).

TO Irving W. Brooks, Chino, Calif. contractor, a Minneapolis-Moline model D-425-6A diesel, 85 hp at 1740 rpm, to power a Gradall excavator.

Maxim Sales Representatives

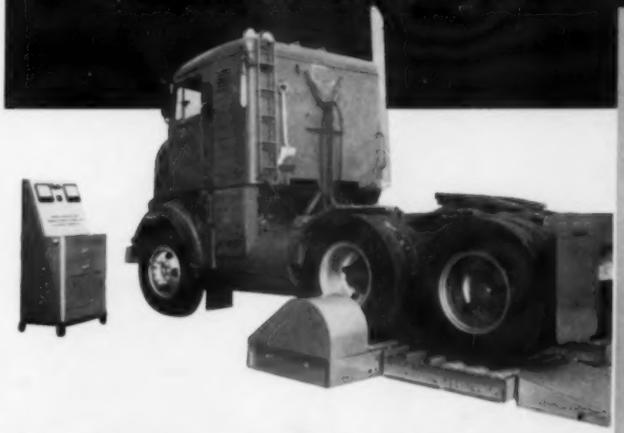
Voyce-Legier, Inc., of Miami, Fla., has been appointed sales representative for Maxim silencers by Emhart Manufacturing Co.'s Maxim Division, Hartford, Conn. Voyce-Legier will handle the Maxim line of industrial, commercial marine and aviation silencers in Florida. The company will also handle aviation silencers in Georgia and Alabama. Officers of the Florida firm include Carl W. Lemmerman, president, Edward W. Legier, vice president, and Lee Voyce, Jr., secretary.

Announce Price Increase

An increase in price of 10 per cent on all Ross type CP heat exchangers has been announced by American-Standard Industrial Division. In announcing the price change, John F. Tobin, vice president-marketing stated "the 10 percent price increase in the type CP line of exchangers has been brought about by the increase in manufacturing costs of these units. In maintaining production of a quality line, our costs of materials and labor have risen to the point where a price increase has become unavoidable." The type CP heat exchanger is best known to the OEM market as lubrication oil and jacket water coolers for internal combustion engines and for compressors, and other applications.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

THERE'S A Clayton DYNAMOMETER FOR EVERY HORSEPOWER NEED



A Complete Line of
CHASSIS DYNAMOMETERS
. . . from 150 to 800 rear wheel h.p.

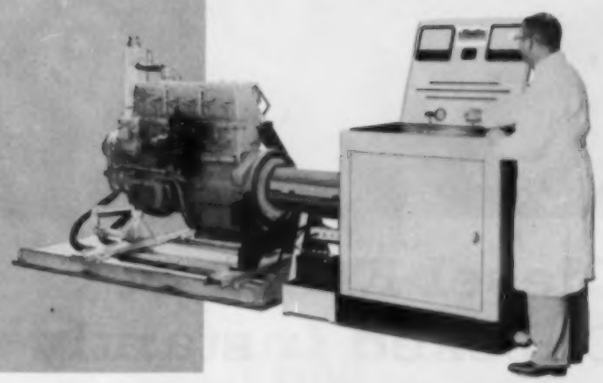
Don't throw away any power built into your truck engine. Trucks operating at specified power get better fuel mileage and give better service. Only the use of a Clayton Chassis Dynamometer can assure *power proved performance.* Permits truck testing under actual driving conditions without leaving the shop. Simple to operate . . . easy to install.

There is a Clayton Chassis Dynamometer to fill every requirement

A complete line of
ENGINE DYNAMOMETERS
. . . from 5 to 6000 horsepower for testing gas or diesel engines

Clayton Engine Dynamometers and Universal Test Stands are designed for "run-in" and test of all types of gasoline or diesel engines, and power units equipped with mechanical clutches or torque converters. Quickly and accurately determines actual performance of new or rebuilt engines. Torque loads can be maintained indefinitely or changed at will. Engines installed in minutes . . . automatic alignment.

There is a Clayton Engine Dynamometer Model to handle any engine



UNIVERSAL TRACTOR TEST EQUIPMENT
...FOR TESTING ALL POPULAR TRACTOR MAKES

Clayton Dynamometers can be used to test any tractor when used with Universal Tractor Test Equipment. Installed separately or in combination with the Universal Engine Test Stand, it provides complete facilities for testing engines without removing them from the tractor. Will also test tractors and heavy duty rubber tired construction vehicles equipped with power take-off drives, driving through mechanical transmission or torque converter.

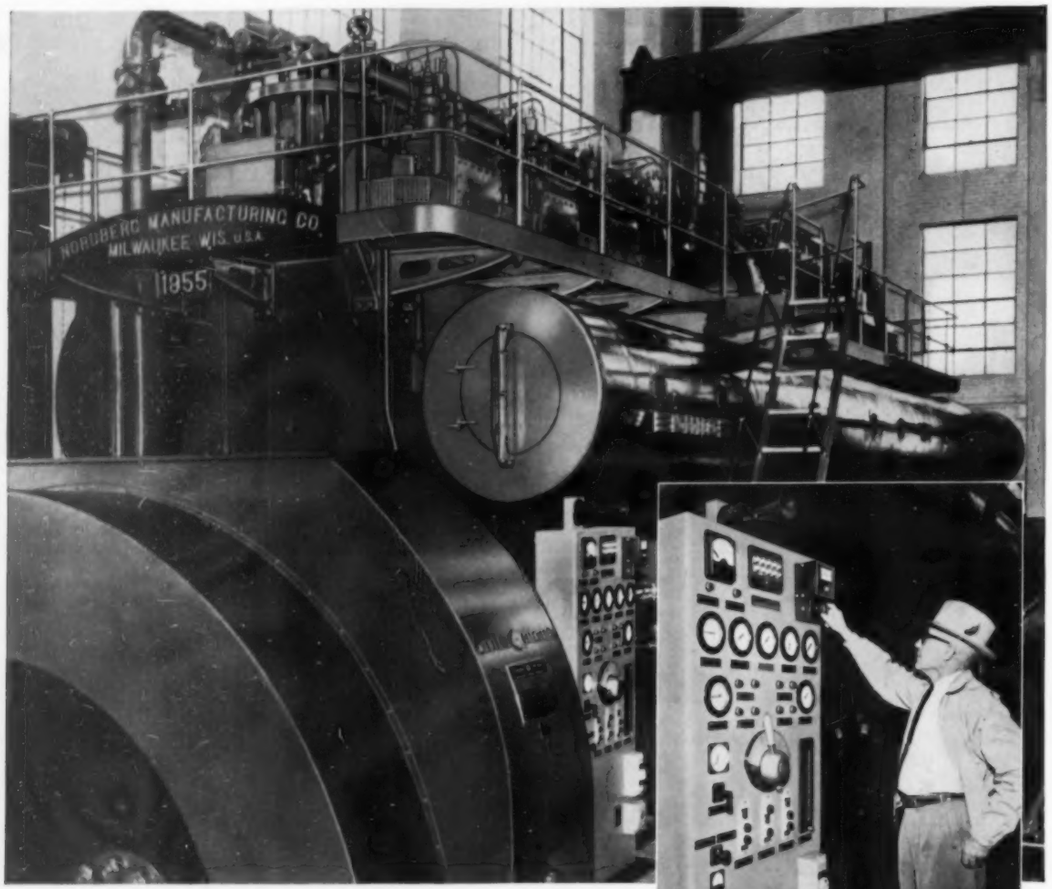
There is Clayton Universal Tractor Test Equipment to test any tractor

309 Clayton MANUFACTURING CO.
443 N. Temple City Blvd., El Monte, Calif.

WRITE FOR FULL INFORMATION ON ANY OF THE ABOVE EQUIPMENT

Fairbanks-Morse Announces Marine Engines Available to 4200 HP

With the growing requirement for larger horsepower diesels on the inland waterways, Fairbanks, Morse & Co. has announced that the model 31-A18 engine is now available for marine application. This engine is available in ranges of 2100 hp to 4200 hp at 277 rpm. This range, together with the model 38 opposed piston engine, now turbocharged, enables Fairbanks-Morse to provide power for a broad range of requirements. This engine will be furnished in both direct reversing and non-reversing modifications; the direct reversing engine can be mounted with a reduction gear to reduce the propeller speed to below 277 rpm if desired. The non-reversing unit can be mounted with a reverse reduction gear for the same purpose. The model 31 marine engine does not have the reciprocating type blower, nor does it have the electric motor driven centrifugal blower. Rather, it is equipped with a pair of positive displacement spiral lobe blowers such as used on the model 38D8⅛ engine. These spiral lobe blowers are engine driven giving a complete packaged marine propulsion unit. Fairbanks-Morse also announced its newly developed phase shifter as it applies to the "OP" engines. This system enables the operator to obtain full power in reverse when applied to a direct reversing engine. It is available for application to engines already installed and operating, as well as new equipment.



Diesel Efficiency Checked Instantly with the *Alnor* Multi-circuit Pyrometer

Checking the exhaust temperature of each cylinder, by the turn of a knob on the Alnor Pyrometer, gives assurance of the operating efficiency of this diesel. Photo, Nordberg Diesel 8500 h.p. installation.

Most diesel power plants operating today are Alnor equipped. Either with the Alnor Pyrotac which has an automatic motor driven switch unit that monitors the exhaust temperatures of each cylinder and gives an alarm signal if the temperature varies above or below a set safety range, or with the multicircuit pyrometer, hand operated as shown here.

A turn of the knob on this Alnor Multi-circuit Pyrometer will give an instant check on the operating efficiency of each cylinder by indicating the individual exhaust temperature.

Improper injection, blow by, stuck rings, failure of cooling, overload, or other malfunctioning of the engine can be immediately detected by checking the exhaust temperatures of each cylinder as indicated on the Alnor Pyrometer. The low cost of Alnor pyrometric instruments compared with the protection they provide for diesel installations makes their place on the control panel indispensable. That is why most diesel power plants are Alnor equipped.

Alnor INSTRUMENTS

ILLINOIS TESTING LABORATORIES, *Inc.*
Room 508 • 420 North LaSalle Street • Chicago 10, Illinois

Announce Organizational Changes

Organizational changes affecting two of its major units have been made by Minneapolis-Honeywell Regulator Co. Vice President Henry F. Dever, head of the Industrial Products Group, transfers from Philadelphia to company headquarters in Minneapolis. James S. Locke, newly elected corporate vice president, becomes vice president and general manager of Brown Instruments Division. Locke, who had been vice president and general manager of Honeywell's Micro Switch Division since 1958, also will be responsible for operation of the Valve Division in Fort Washington, Pa. and the Fall River, Mass. Division. The Industrial Products Group was formed in 1957. In becoming head of Brown Instruments, Locke assumes direction of one of Honeywell's largest and most important divisions. It is a leading producer of instrumentation for industrial process and military applications and its five plants in Philadelphia employ more than 3,200 persons. Dever, who joined Honeywell in 1926 as a sales engineer, was vice president of Honeywell in charge of engineering before becoming president of Brown Instruments in 1945. He is a director and past president of the Scientific Apparatus Makers Association.

Standby Electric Plant Selection

"Standby Electric Plants and Controls—a Guide to their Selection and Installation" . . . is the title of an eight-page folder offered by D. W. Onan & Sons Inc. Beginning with the need for Standby Power, Onan's new folder outlines steps to be considered in the selection of any emergency electric generating plant. Practical suggestions are offered in the planning and designing of the installation, the degree of protection desired, important "musts" to consider, and common errors to avoid. The folder also lists items to evaluate to meet particular requirements in specific installations—for example: Manual, automatic or instantaneous starting; type of fuel; air or water-cooling; special heaters; radio shielding; plant exercisers and instrument panels. Copies of the brochure are available from D. W. Onan & Sons Inc., 2515 University Ave., S.E., Minneapolis 14, Minn. (ITS NEW)

GET REAL PRODUCTIVITY—GET A GM DIESEL

Productivity's bound to go up—and so is your net profit—if you get yourself an engine that costs less to buy, less to maintain and less to run.

And that's exactly what Marion Duzich has in his three double-rig GM Diesel-powered shrimp trawlers.

He's been in the business 23 years—has a lot of good reasons for standardizing on GM Diesels.

First place, his 6-110 "Jimmys" cost less to buy than other Diesels of equal power.

They cost less to maintain, too. He's only spent $30 on the "Jimmy" in his *American Star* in 8 months—only $130 for injector rebuilding on the four-year-old "6-110" powering his *Marion D.*

And his 73′ *American Lady* is one of the fastest boats for its size you'll see anywhere—helps him travel faster, make more trips per season. Her "6-110" GM Diesel burns 10 gallons of fuel per hour turning a 50″ x 40″ 4-blade wheel through a 4.5:1 gear ratio. And like other "Jimmys," the "6-110" will operate efficiently on any fuel that meets the specifications of competitive Diesels.

Your profits and productivity will go up, too, if you put a GM Diesel in your boat. Next time you're buying or repowering, get an engine that will better your "net"—get a GM Diesel from the 20 to 1650 h.p. All-Purpose Power Line.

GM DIESEL

DETROIT DIESEL ENGINE DIVISION,
GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Parts and Service Worldwide

GM DIESEL ALL-PURPOSE POWER LINE sets the standard of Diesel productivity

Florida Diesel News

By Ed Dennis

THE *Broward II*, a 135 ft. Tampa Bay shell dredge has a model VDSB Superior diesel engine rated 550 hp at 330 rpm to power the 18x16 in. Maddox shell pump. Other Superior dieselized equipment include 264 kw and a 100 kw generating sets. The dredge pumps about 300 yds. of shell per hr. and is owned by Benton & Co. of St. Petersburg.

A model D397 series D Caterpillar diesel engine to power an Ingersoll-Rand air compressor for Pan American Airways new Jet program. This Cat diesel has a Roots blower and is rated 450 cont hp at 1200 rpm. Shelley Tractor & Equipment Co. of Miami furnished the diesel.

FOR Anclote Key Station a 500 kw generating set powered by a 12 cylinder model VLRDBSU Waukesha diesel generator. This is part of the Bomar missile program.

TWO model 380 Michigan tractor dozers powered with NFT-6BI Cummins 375 hp diesel engines, Clark torque converters and transmissions are being used by Smith Engineering & Construction Co. of Pensacola on road construction work near Santa Rosa Island. They are helping to move about 1-million cu. yds. of dirt for the new road.

A General Motors 2-53 diesel having a hp rating of 47 at 2000 rpm to provide power for a high pressure agitation pump on a dredge owned by Heron Dredging Co. of Palm Beach Isles from Miami Branch, Detroit Diesel Div. who also supplied the yacht *Champagne* with two GM 6-71 diesels with hydraulic 2:1 r&r gears.

AMERICAN MARC, builders of small light weight diesel engines, plan to build a $500,000 factory in South Florida. Officials of American MARC announced the new plant will turn out 6000 pleasure boats a year.

FOR standby service at Camp Losey, Puerto Rico, four Superior model 40-SX-6 turbocharged six cylinder diesel engines rated 433 hp at 720 rpm with 300 kw, 2400/4160 volt Ideal generators, Kittell silencers, UG 8 Woodward governors with synchronizing motor and Ross lube oil coolers.

THE *Cay Sal*, a trim, triple screw charter cruiser out of Key West, had two six cylinder Ford diesels rated 96 hp at 2400 rpm plus a middle trawling four cylinder 68 hp Ford diesel installed. These have Paragon 2:1 r&r gears. All three diesels were marined by Modern Diesel Power Co. of Tampa. This craft fishes for marlin and the other big ones of the Keys.

SEVERAL International model 65 Payhauler 18 ton dump trucks were delivered to the Ocala Lime Rock Corp. at Ocala. These are powered by NT6BI turbocharged Cummins four cycle diesel engines.

THE *WaWa*, a 72 foot trawler launched by Diesel Engine Sales of St. Augustine is powered with a Caterpillar D342 diesel engine which turns a 38x52 in. four blade Federal propeller through 3:1 Twin Disc r&r gears. A Petter diesel drives the 1500 watt Win-Power generator.

NEAR Fort Lauderdale, the Donaldson Engineering Co. is using an International 2T55 Payscraper for grading on a new housing development. The Payscraper is powered with a HRBJ Cummins diesel rated 172 hp at 1800 rpm.

THE Tampa office of Florida Georgia Tractor Co. delivered a TD20 International crawler tractor to J. W. Conners & Sons Contractors of Tampa. The unit

Low pressure loss air filtration

for intakes of turbocharged engines

What's Your Need? No one filter can meet all requirements. Low pressure loss, however, is a prerequisite. Air-Maze has a wide line of similar low pressure loss filters built for turbocharged engines.

For your requirements, call in your Air-Maze representative, or write for any of the bulletins listed.

TRAVELING CURTAIN

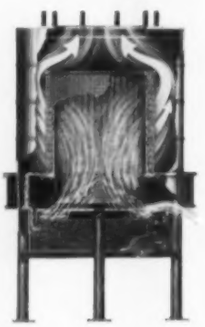
Automaze®

A viscous impingement panel-type filter that cleans itself... automatically. Goes 3 to 6 months or more without attention. Maintains initial filtering efficiency and low pressure drop because the filter panels are continuously cleaned and recharged with adhesive. Single units in sizes to 30,000 cfm. Details in Bulletin AMC-256.

CYLINDRICAL OIL BATH

Type LPD

(Low Pressure Drop)



This type of filter has no moving parts, yet provides high dirt-removing efficiency with pressure loss as low as 1-inch water gauge. Available in capacities up to 24,000 cfm, depending upon tolerated pressure loss.

Service is limited to occasional checking of oil level and periodic draining and cleaning of sludge. Write for Bulletin LPD-1055.

FOR REPLACEMENT OF VISCOUS PANELS

Panel Bath

Lends itself to simple, inexpensive installation in existing vertical panel adapters on railroad engine air intakes. Utilizes an air stream to engage oil in a reservoir carrying the oil to the filter media. Impinged, dirt-laden oil drains to sump carrying the dirt with it. The action provides a continuous, efficient self-cleaning action. Operating range—400 to 1,750 cfm. Ask for Bulletin RPB-1058.

FOR OIL-FREE FILTRATION

"DA" Dry-Type

Gives better than 98% efficiency on 2-micron mean diameter particles and 100% filtration on 5-microns or larger. Suitable for installations where—oil-free air is required; extremely high degree of filtration is required; where air velocity varies from one period to another; where dirt concentration is relatively low. Can be sized to meet any pressure drop requirement. Ask for Bulletin DA-1056.

The biggest names in diesels are protected by Air-Maze filters

AIR-MAZE

The Filter Engineers

Dept. DP-5 Cleveland 28, Ohio

Subsidiary of ROCKWELL—STANDARD Corporation

AIR FILTERS • SPARK ARRESTERS • LIQUID FILTERS • SILENCERS • OIL SEPARATORS • GREASE FILTERS

is equipped with the new six cylinder International 134 hp diesel engine.

UP at Ocala, the Marion Construction Co. was using four Caterpillar DW15 four wheel tractors and 10 cu. yd. scrapers. These are powered with Cat 186 hp diesels. For push loading, a Cat D8 was used and four D7 Cat dozers were being used for miscellaneous work. The company was doing construction work on the new 5000 ft. runways at the airport.

THE Ward-Samons Construction Co. of Fort Myers took delivery of a model 101 Marion 3½ yd. dragline powered with a Cummins NHRIS diesel rated 300 hp at 2000 rpm and a Clark torque converter. The dragline digs about 800 yds. of rock and sand in a 24 hr. period and is working at Lehigh Acres.

THE Hialeah Branch of Cummins Diesel Sales Corp. repowered a White 5000 COE hiway tractor for Freeman & Sons with a model JT6B turbocharged Cummins 175 hp at 2500 rpm plus a NH 195 naturally aspirated Cummins in a similar installation. Both have Fuller transmissions.

SIX Allis-Chalmers TR260 rock wagons (rear dump) 15 cu. yd. (20 tons) heaped were delivered to Quality Lime Rock Co., Summerfield from Richardson Tractor Co., Tampa. These are powered with 230 hp Allis-Chalmers 16000 diesel engines.

TWO three cylinder Fairbanks-Morse model Y diesel engines rated 180 hp at 257 rpm power the three Fairbanks-Morse (55,000 gpm each) pumps at Bear Beach pumping station to control the water level in the surrounding sugar cane fields. The pumps pump out of and into Lake Okeechobee.

THE Florida Georgia Tractor Co., Tampa, delivered two International dieselized UD64-6 power units to power 18 in. lolift, high volume B. G. dewatering pumps to Floramar Developing Co. at New Port Richey who are building a marina.

SEEN at Diesel Engine Sales, Fort Myers, the 120x26 ft. menhaden fishing craft *Capt. Alex Lewis*. The two 6-110 General Motors diesels turn 52x48 three blade propellers through GM 3:1 hydraulic r&r gears for a speed of 12 knots.

AT Margate, the Linke-Smith Inc., Co. is currently using three DW21 two wheel Caterpillar tractors and 25 cu. yd. scrapers. These are powered by six cylinder turbocharged 300 hp Cat diesels. The firm uses two D8 dozer tractors, 190 hp, for push loading and grading work on roads and land filling.

Distributor Named

The J. E. Lonergan Company has appointed the Fluid Controls Co., Philadelphia, its representative in the Philadephia, South Jersey and Virginia territories. Lonergan manufactures safety and relief valves and pressure gauges for the power, process, and mechanical industries for use with boilers, air receivers, hydraulic systems, process equipment, and for general pressure vessel protection.

Sales Appointment

Willard E. Sanvik has been named a Minneapolis area salesman in the industrial wholesaler division of Dayton Industrial Products Co., of Melrose Park, Ill., a division of Dayton Rubber Co.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

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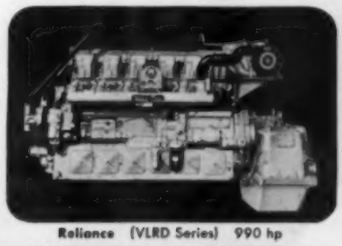
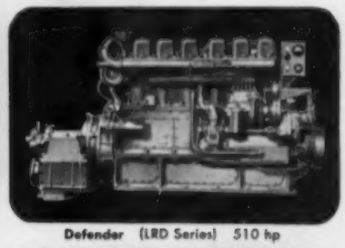
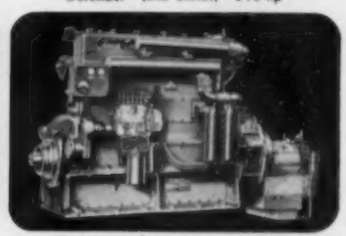

Reliance (VLRD Series) 990 hp

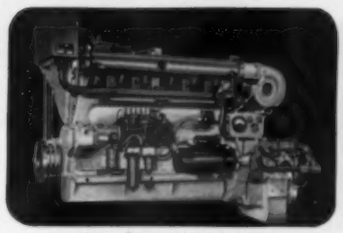

Defender (LRD Series) 510 hp

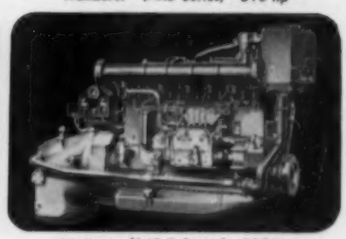
WAUKESHA MARINE Diesels

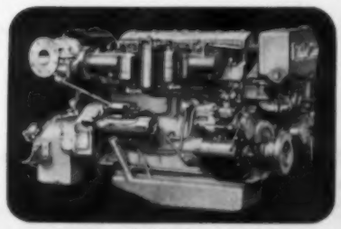

Wanderer (NKD Series) 315 hp

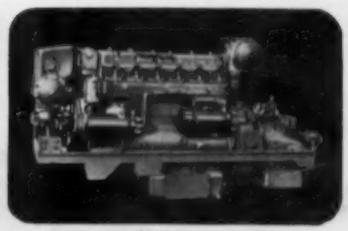
UP TO 990 HP • 24-HOUR DUTY

- Easy Starting
- Reliability
- Simplicity
- Smoothness
- Economy


Resolute (WAKD Series) 290 hp


Vigilant (148-D Series) 195 hp


Cutwater (135-D Series) 120 hp


Navigator (197-D Series) 85 hp

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Diesel and carburetor fuel models ... up to 800 KW. A proven record of reliability, backed by over 50 years' engine-building experience.

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for fishing vessels ... tugs ... towboats and work craft of all types

Engine	Type	Cyls.	Bore & Str.	Displ.	24-Hr. Max Rating
RELIANCE	Normal	12	8½ x 8½	5788	725 hp @ 1215 rpm
	Turbo	12	8½ x 8½	5788	990 hp @ 1215 rpm
DEFENDER	Normal	6	8½ x 8½	2894	335 hp @ 1215 rpm
	Turbo	6	8½ x 8½	2894	510 hp @ 1215 rpm
WANDERER	Normal	6	7 x 8¼	1905	240 hp @ 1215 rpm
	Turbo	6	7 x 8¼	1905	315 hp @ 1215 rpm
RESOLUTE	Normal	6	6¼ x 6½	1197	195 hp @ 1600 rpm
	Turbo	6	6¼ x 6½	1197	290 hp @ 1600 rpm
VIGILANT	Normal	6	5¼ x 6	779	150 hp @ 1800 rpm
	Turbo	6	5¼ x 6	779	195 hp @ 1800 rpm
CUTWATER	Normal	6	4¼ x 5	426	100 hp @ 2000 rpm
	Turbo	6	4¼ x 5	426	120 hp @ 2000 rpm
NAVIGATOR	Normal	6	4 x 4	302	65 hp @ 2000 rpm
	Turbo	6	4 x 4	302	85 hp @ 2000 rpm

WRITE FOR DESCRIPTIVE LITERATURE

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FIRM EXPANDS "DOUBLE-BOTTOM" SERVICE

By JIM BROWN

THE Western Express Co. of Cleveland, Ohio, an initial user of the new tandem-trailer trucking system now officially approved by the New York thruway and the Massachusetts Turnpike, is rapidly expanding its double-bottom service on these highways. Initiated as a test program in February, 1959, permission to pull two of the big 40 ft. "semis" with a single tractor over both the New York Thruway and the Massachusetts Turnpike was put on a permanent basis on June 31, 1959. Western Express Company has increased its original complement of three tractors and 21 trailers in this service to six tractors and 105 trailers, and by the time this story appears may have as many as eight of the big combinations in service, each capable of hauling approximately 82,000 lbs. of payload within the over-all limitation of 127,400 lbs. gcw for each unit.

Three things have given this trend to double-bottom haulage on the toll roads additional impetus: (1) Proving out of anticipated savings to the trucking companies and additional revenue to toll roads*, (2) Opening of the new thruway bridge over the Hudson which now permits through operation from Ripley, N.Y. to Boston, Mass. without breaking the combinations up into conventional units and (3) Complete endorsement of a plan by the New York Thruway and Massachusetts Turnpike authorities as a permanently acceptable and workable idea.

The reaction of everybody concerned has been enthusiastic. Stringent regulations for the permanent control of the traffic have been drawn up with the assistance of the trucking companies themselves, because the safety-conscious truckers are as much interested in keeping it regulated on a sensible basis as are highway authorities.

With reference to the safety of the operation, we asked F. S. "Double-bottom" Thompson, Western Express Co.'s vice-president in charge of traffic, just how many accidents they had had with the tandem rigs since they started the operation almost a year ago. "Well, we had one," Mr. Thompson related, "An automobile driver apparently changed his mind about pulling off the highway and backed down a grade into the second trailer of one of our units. This of course our driver couldn't prevent, although he did everything he could to get out of the way."

Incidentally, Western Express has had an enviable safety record on the toll roads: Including all accidents in which a highway driver was involved, even if he was completely blameless, the company started with a record of 146,000 mi. per accident in 1954 and has steadily improved this record to 331,000 mi. per accident in 1958. Three times in recent years the company has rolled up over 1,000,000 *consecutive* miles without an accident and in 1957 they reached a total of over 2,000,000 consecutive miles without an accident.

As can be seen by the accompanying chart, Western Express Co. is finding it profitable to go to higher horsepower diesel engines to pull the 127,400 lb gcw units. They are converting two of their 335 hp tractors to Cummins NT 380 engines with 380 hp. They also have a second International tractor with a 375 hp IHC 817 engine on order for this service. This unit will be the seventh tractor in the tandem-trailer thruway service, and two more of the big jobs are currently on order. On the N.Y. Thruway and Massachusetts Turnpike, the regulations limit tandem units to 50 mph but call for minimum of 20 mph on 3 percent grades.

"The advantages of being able to move two trailer-loads over a 500 mi. route at average speeds approximating 45 mph with one tractor are obvious" said Mr. Thompson. "But of course our competitive system assures that any reduction of costs along this line will eventually be beneficial to shipper, manufacturer and ultimate consumer. Since the New York Thruway and Massachusetts Turnpike experiments with double-bottom traffic have worked out so successfully, we anticipate that the Indiana and Ohio turnpikes will find the movement equally acceptable. The Pennsylvania Turnpike Authority has objected, so far, principally on account of their tunnels. What we need now, or will need especially as soon as the Indiana and Ohio Turnpikes formally approve, is a connecting

* (See "Tandem Trailer Tests Show Cost Reduction", DIESEL AND GAS ENGINE PROGRESS, July 1959)

Western Express Company's No. 7003 COE Kenworth on the New York Thruway. Tractor is powered by a 335 hp Cummins NFT-6-B diesel with Spicer clutch and 12-speed transmission.

Western Express Company's Tractor No. 7005, a brand new cab-over-engine Kenworth destined for "double bottom" service, receiving its first lubrication check.

This is the Western Express Company's tractor unit 7002 (described in the accompanying chart), one of the first "tandem trailer" tractors to be run over the New York thruway.

link between the New York Thruway and the Ohio Turnpike. Then we can render high-volume express service all the way from Chicago to Boston or from Chicago to New York City."

Testing of the "double-bottom" operation on the Ohio and Indiana Turnpikes started on January 18th 1960 and those "in the know" predict almost certain approval of the operation on these highways. Since many other common carriers besides Western Express Co. participated in the tests and are keenly interested in the development, the "double-bottom" movement will bring an immediate impetus to the overall use of diesel tractors in the East North Central, Middle Atlantic and lower New England states.

Western Express Co. is a subsidiary of Cleveland Cartage, a 45-year old concern which operates from the Mississippi River east to the Atlantic and southward to include the state of Kentucky. Cleveland Cartage engages in a wide variety of services through various subsidiaries including its work as a common carrier, in machinery moving and erection, rigging, cement hauling, warehousing and truck leasing operations.

In all, the company owns about 1800 units (trucks, trailers and tractors). Most of its diesels are currently operated by Western Express, but John W. DeVenne, president and general manager of Western Express and executive vice president of Cleveland Cartage, told us they have about 55 more diesels on order to supplement the 19 currently operated. He said many of the new units would be used in heavy duty short-haul operations such as cement hauling where much of the work is practically "off the road". Mr. DeVenne is also interested in the economy possibilities of smaller diesels for a wide variety of services.

Besides the 19 diesel units currently owned by Western Express, there are approximately 40 others owned by people who drive for the firm. These vehicles are not maintained by Western.

We asked R. P. (Dick) Knight, superintendent of maintenance, about the company's maintenance procedures and he gave us copies of the company's preventive maintenance forms. Every diesel unit, for example, is "flagged down" for an A (Weekly), B (10,000 mi.) and C (20,000 mi.) routine with some odd-interval "D" maintenance operations mandatory at 40,000, 50,000, 80,000, 100,000 and 250,000 mi. The routines are backed up by mimeographed instructions covering each item; one for the mechanics and one for the lubrication men.

At the end of each round trip the driver turns in an equipment report which is forwarded to Cleve-

PM GUIDE FOR DIESEL SERVICE INTERVALS

KEY: A= Weekly
B= 10,000 miles
C= 20,000 miles
D= Dynamist, designated

		A	B	C	D
REAR ENDS	1. Check axle flange nut		B		
	2. Check for oil leaks	A			
	3. Check for excessive heat	A			
	4. Check fire ceiling		B		
	5. Check alignment of axles			C	
	6. Drain and clean			C	
	7. Exchange magnetic plugs		B		
	8. Remove and rebuild				D (100,000)
	9. Check seals		B		
	10. Check pinion and drive shaft for adjustment or slack		B		
WHEELS & BEARINGS	1. Check adjustment		B		
	2. Repack front wheels			C	
	3. Repack rear wheels				D (80,000)
	4. Check seals		B		
	5. Lube or repack slack adjusters			C	
STEERING	1. Check tie rod and drag link	A			
	2. Check cylinder		B		
	3. Rebuild front spindles				D (100,000)
	4. Check steering gear lube			C	
	5. Check steering stack		B		
	6. Set front alignment			C	
	7. Rebuild steering gear				D (100,000)
CHASSIS	1. Tighten all cab mounts		B		
	2. Check cab lift and locking mechanism		B		
	3. Tighten all bolts and crossmembers			C	
	4. Tighten all brackets and mounting parts			C	
	5. Make 3 way alignment check				D (100,000)
	6. Check drive line angularity				D (50,000)
ENGINE	1. Change oil and filters		B		
	2. Check valves and injectors				D (30,000)
	3. Check fuel pump pressure				D (30,000)
	4. Change fuel filter and clean		B		
	5. Change or clean pump and injector screens				D (30,000)
	6. Change cylinder heads (or grind valves)				D (100,000)
	7. Remove and exchange injectors				D (100,000)
	8. Rebuild engine (see special information)				D (250,000)
	9. Dynamometer check				D (30,000)
	10. Check for leaking		B		
	11. Check for oil leaks	A			

(Note: Supplemental instruction sheet covering Check #1 coincides with "B", Check #2 coincides with "C")

Western's diesel tractor PM form.

The dispatch room in Cleveland, which is in constant touch with all Western Express units. Trucks, tractors and trailers are represented by cards which are moved from one location to another on the board as reports come in. Leased-wire teletype machines are visible in the background.

land and upon which any malfunction is noted. The service management (Mr. Knight's office) keeps a master file of 7½" x 5" records upon which the next "due date" for A, B, C or D service is noted in red in shorthand form. Thus a red "85/5" in the "C" column means that at 85,500 mi. (or as near to this as is practical) the unit should be pulled off the road for another "C" servicing.

Other than the above brief resume, it is difficult to generalize about when and where Western Express and Cleveland Cartage units are serviced. Most of Western's "big stuff" such as the double-bottom tractors, are brought into Cleveland and receive their PM checks in the main garage at that time. Most of the double-bottom drivers live in the Cleveland area and make a week-end run down from Ripley, N.Y. (western end of the N.Y. Thruway) with a single trailer load at which time the tractor and trailer can be serviced. These Thruway drivers cover from 3,500 to 4,000 mi. in a 5-day week. A new terminal with service facilities and fuel tanks is being constructed for Western at Ripley and should be in use this spring.

Cleveland Cartage units are also serviced in the company's main garage on E. 40th St. in Cleveland, but Cleveland Cartage has service facilities scattered all over the area, as well. Mr. DeVenne told us a whole day could be spent just driving from one Cleveland Cartage garage to another in the Cleveland Metropolitan area. Western Express Company has about 30 offices between Chicago and Boston at present, with shop facilities in about half of them.

Unit No.; Type truck or Tractor	Engine Make, Model and hp.	Transmission	Clutch	Axles
7000 - International	Cummins NFT-6-B, 335*	Spicer 8125, 12 speed.	Spicer 15½", 2 plate	Dual, Eaton 38D3A
7001 - Mack	Cummins NFT-6-B, 335	Mack 158P Triplex	Mack 15½", 2 plate	Dual, Mack BWKL56
7002 - Autocar	Cummins NFT-6-B, 335	Fuller R96 10 sp. Rd Rg 2	Spicer 15½", 2 plate	Dual, Timken 6.17 SQHD
7003 - Kenworth	Cummins NFT-6-B, 335*	Spicer 8125 12 speed	Spicer 15½", 2 plate	Dual, Timken 6.17 SRHD
7004 - International	IHC 817 375 hp.	Spicer 8125 12 speed	Spicer 15½", 2 plate	Dual, Eaton 38D3A 4.87
7005 - Kenworth	Cummins NFT-6-B, 335	Spicer 8125 12 speed	Spicer 15½", 2 plate	Dual, Timken SRHD 6.17
*CONVERTING TO Cummins NT-380				
ABOVE TRACTORS CURRENTLY IN "DOUBLE BOTTOM" SERVICE				
866 - White	Cummins NH-180	White 5072	White 15-4A	White 1340, 4.11
867 - Kenworth	Cummins NH-180	Spicer 8125 12 speed	Brown-Lipe 14", 2 plate	Timken R-140-P
868 - White	Henschel (experimental)			
2150 - Kenworth	Cummins NH-220	Spicer 8125 12 speed	Brown-Lipe 14", 2 plate	DSW-LHFR2, 5.27
2270 - IHC (truck)	IHC Experimental			
10 - IHC (truck)	Cummins NH-220	Fuller R96-10 speed Rd. Ranger.	Spicer 14" 2 plate	Eaton 1911 single, 4.33

List of Western Express Co. diesels and their equipment.

Company headquarters keeps in constant touch with all of its terminals by a leased-wire teletype system. Each of the units, whether on the road or garaged, is represented by a card which is moved from one slot to another as the unit is "reported in" at a new location.

Western is using a popular brand No. 2 diesel fuel in all of their diesel units. They use a series 3 lube oil, not confining their purchase to one "brand". Mr. Knight said they are trying to work their oil changes up to a 10,000 mi. basis if lab tests justify it; he showed me a sample ready to go to the lab which had run 8,600 mi. Most of their units employ Luberfiner 750C oil filters.

The Cleveland Cartage operation, including the long-haul Western Express and other subsidiaries, moved 236,000 tons of payload in 1958 and 270,000 tons in 1959. In 1959 its units covered about 22,000,000 mi. This is definitely "big league" stuff, but we were pleasantly surprised at the courtesy and patience with which they received us. J. C. DeVenne is president of the parent company; Western Express executive personnel not mentioned above includes Thomas A. Harrison, v.p. operations; William F. Smith, v.p. sales; T. L. Mainwaring, comptroller; George N. Plavac, safety, service and legal; Roy E. Lowe, traffic manager; Nicholas Duda, rates and William G. Buck, Jr., central dispatch.

J. A. DeVenne, vice-president and J. W. DeVenne, president of Western Express Company, check over plans for their newest garage and maintenance facility.

OGP CONFERENCE STRESSES ECONOMICS OF ENGINE POWER

Many Highly Informative Technical Papers, Excellent Speakers, Exhibits and Special Events Make 32nd Annual ASME Meeting in Kansas City A Must for Engine Builders and Operators

FOR its 1960 meeting, the Oil & Gas Power Division of ASME has arranged what should be the finest schedule of papers, panels and sessions ever programmed for men responsible for purchasing and operating diesel and natural gas engines. "Economics of Engine Power" is the theme of the meeting which will be held in Kansas City, May 23-26 at the Hotel Muehlebach.

Mr. John C. Gibb, chairman (1960) Oil and Gas Power Division points out that the over-all program has been developed to appeal to a broad base of individuals who are interested in the use of internal combustion engines. He states, "Nonmembers, as well as ASME members, can attend and participate in the OGP Conference. Everyone who is concerned with any aspect of the building or use of internal combustion engines is cordially invited to take active part in all of our technical sessions and other conference events. It is not necessary to be a member of ASME to attend our public meetings." Hosting the 1960 meeting is the Kansas City Section, ASME-OGP and Jos. T. Adams is general chairman of the General Arrangements Committee.

John C. Gibb

Jos. T. Adams

Certainly the schedule of papers to be presented during the conference is impressive and has a broad range of interest. The papers run the gamut from "Nozzle Design Cuts Locomotive Fuel Cost" to all-encompassing subjects such as "Horsepower to Heat the Nation". The entire list of papers is included in the official program which is reproduced on the next page.

As a vital adjunct to the conference, some 26 companies will display their products and recent developments. Thus, conferees will have the two-fold opportunity of obtaining the most up-to-date information about products and services pertinent to their industry and participating in the conference sessions. Perhaps one of the most stimulating "off the cuff" events during the ASME-OGP is a program called "What's New". During this session new developments in the industry are presented by the representatives of the exhibiting manufacturers and suppliers.

Mr. Walker L. Cisler, president of Detroit Edison Co. and president of the ASME will deliver the principal address at the banquet on Wednesday, May 25th. He has chosen as his subject "The Human Side of Energy and Fuel". Mr. John C. Gibb, chairman of ASME-OGP and senior engineering representative, Socony Mobil Co., Inc., will preside at the banquet. Mr. Eugene L. Miller, president, Diesel Engine Manufacturers Association, and president, The Cooper-Bessemer Corp., will be toastmaster. Among the personages to be honored at the banquet for Outstanding Service are Messrs. Emil Grieshaber, retired chief engineer of Nordberg Mfg. Co. and John Worthington, manager, Piston Ring and Seal Department, Metal Products Division, Koppers Co. OGP Speakers' Awards will be presented to C. M. Floyd, senior research engineer, Humble Oil and Refining Co., and to W. C. Fischer, director of engineering, Fairbanks, Morse & Co. Mr. W. S. Quimby, senior technologist, Research and Technical Department,

"THE HUMAN SIDE OF ENERGY AND FUEL" IS BANQUET TOPIC

MR. Walker Lee Cisler, President of the American Society of Mechanical Engineers will deliver the principal address at the ASME-OGP banquet and has chosen as his subject "The Human Side of Energy and Fuel." Mr. Cisler is president and director of the Detroit Edison Co. Born in Marietta, Ohio, Oct. 8, 1897, he has spent his entire business career in the electric power industry. He has also found time to participate in a large number of civic and governmental activities. As an executive of Detroit Edison Co. he has been actively engaged in the atomic energy development since shortly after the end of World War II. He served as executive secretary of the AEC Industrial Advisory Group (1947-1948) and has been responsible for the Company's participation in the activities of the Atomic Power Development Associates, Inc., and the Power Reactor Development Co. He is a Fellow of The American Institute of Electrical Engineers, The American Society of Mechanical Engineers, and the American Institute of Management and has served on many of the technical and administrative committees of those societies. He received the George Westinghouse Gold Medal Award from ASME, the Henry Lawrence Gantt joint award by ASME and AMA, and the Washington Award from the Western Society of Engineers, and also received the George W. Goethals Award from the Society of Amreican Military Engineers.

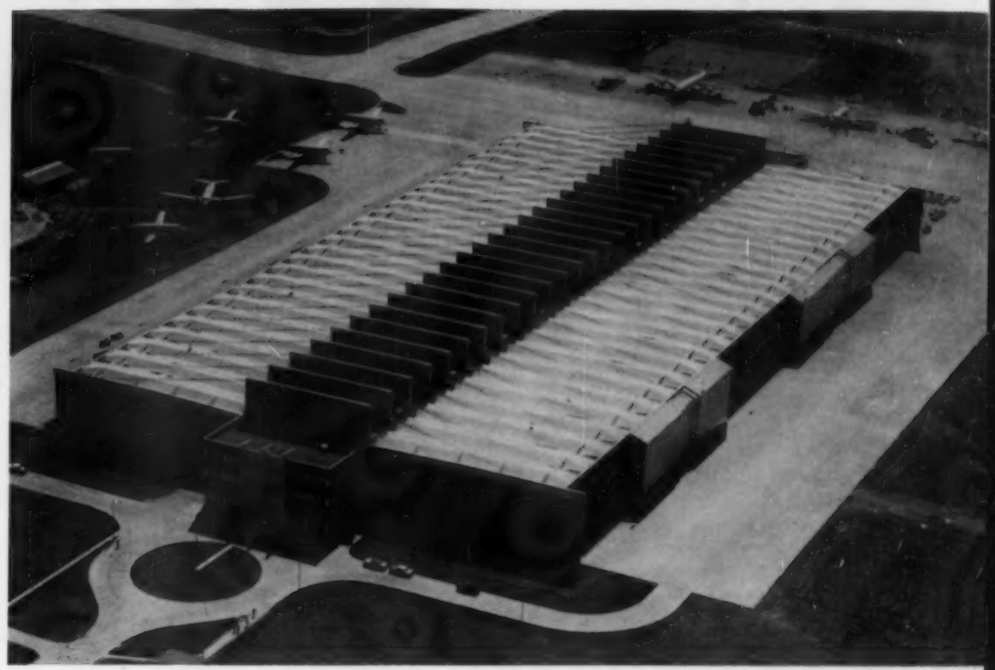
Walker L. Cisler

During the war Cisler held many assignments, first in the War Production Board, Office of War Utilities, and later with the Armed Forces in Europe. In 1943 he was commissioned a Lieutenant Colonel and assigned to the rehabilitation of the electric, gas and water facilities in the Mediterranean area. Later he was appointed a Colonel and head of the Public Utilities Section of the Supreme Headquarters Allied Expeditionary Forces (SHAEF) and was responsible for similar activities in the European Theatre of Operations. His services to the government since the war have continued without interruption. He has served on many government committees and as consultant to the Army, State Department, Atomic Energy Commission and most recently to the Defense Department as a special consultant in connection with the space and missile program.

He serves as a member of the Business Advisory Council for the Department of Commerce. In 1955 he was appointed to a Special Task Group studying disarmament. In the same year he was designated an advisor on the United States Delegation to the International Conference on the Peaceful Uses of Atomic Energy in Geneva. He has been decorated by seven European governments and by the United States government in recognition of his interest in their behalf, both during and since the war. He holds honorary degrees of Doctor of Engineering from the University of Michigan and Stevens Institute of Technology and Doctor of Law degrees from the University of Detroit, Wayne State University, Marietta College and Doctor of Science degrees have been awarded to him by the University of Toledo and Indiana Technical College.

Texaco, Inc., will receive the Special Lecture Award at the banquet.

One of the highlights of the Monday Session will be the Student Achievement and Welcome Luncheon during which time the three winning students of the Region VIII student competition and their faculty advisors will be guests of OGP. Each of the students will present his winning paper and will be awarded an OGP certificate commemorating the event. On Tuesday, beginning at 1:30 p.m. an Inspection Trip to the TWA International Overhaul Base will be held. Here visitors will see the repair, overhaul, assembly and testing of TWA's largest engine and jet-powered planes at one of the largest facilities of its kind in the world. During the afternoon session on Wednesday, May 25th, a panel discussion, moderated by H. R. Sennstrom, vice president, Engineering and Sales, American Bosch Arma Corp., will discuss "Preventive Maintenance of Internal-Combustion Engines by Spectographic Analysis". Registration will commence Sunday afternoon, May 22 in the foyer of the Grand Ballroom and will continue May 23-25 from 8:30 a.m. to 3 p.m. The Conference Program follows:



Symmetry of design highlights this aerial view of Trans World Airlines airframe overhaul building at Mid-Continent International airport at Kansas City, Mo. The structure is 1000 ft. long by 420 ft. wide. On each side of the center ground floor shop area are two huge hangars, 816 feet long by 160 feet wide. This is the facility that OGP members and guests will tour on May 25.

MONDAY, MAY 23

9:00 a.m. to 6:00 p.m.: Exhibit Open, Grand Ballroom

SESSION I

9:30 a.m.: Trianon Room

Chairman: Stephen A. Bergman, Chief Engineer, Panhandle Eastern Pipe Line Co. Kansas City, Mo.

Vice Chairman: William C. Day, Manager, Gas Engineering Dept. Columbia Gas System Service Corp., Columbus, Ohio
"Economics of Engine Power Development of the Alco 251 Engine," by Paul S. Vaughan, Chief Engineer, Engine Development Alco Products, Inc., Schenectady, N. Y.
"Horsepower to Heat the Nation" by Robert S. Jefferies, Manager, Gas Storage, New York State Natural Gas Corp., Pittsburgh, Pa.

11:45 a.m.: Exhibitors' Social Hour (Ladies Invited), Grand Ballroom, Exhibit Area

12:30 p.m.: Welcome Luncheon (Ladies Invited), Colonial Room

Master of Ceremonies: Harold Grasse, Vice President, Region VIII, ASME, and Partner, Black & Veatch, Kansas City, Mo.

Welcome: L. A. Platt, Chairman, Kansas City Section
The OGP Division is honoring the first prize winners and their faculty advisors from each of the three Regional Student Conferences in Region VIII.

SESSION II

2:00 p.m.: Trianon Room

Chairman: Charles C. Keane, Chief Engineer, Great Lakes Pipe Line Co., Kansas City, Mo.

Vice Chairman: Rex R. Robinson, Assistant Director of Research Caterpillar Tractor Co., Peoria, Ill.
"Internal Combustion Engines in Steam Power Stations" by Glenn C. Boyer, Consulting Engineer, Universal Engineering Co., McPherson, Kan.

"What's New?" Moderator: John E. Onnen, Midwestern District Manager, Koppers Co., Chicago, Ill.
3-Minute briefs of new developments in the industry, by representatives of exhibiting manufacturers

TUESDAY, MAY 24

9:00 a.m. to 12:00 Noon: Exhibit Open, Grand Ballroom

SESSION III

9:00 a.m.: Trianon Room

Chairman: Ted Watson, Chief Engineer, Scintilla Division Bendix Aviation Corp., Sidney, N. Y.

Vice Chairman: Lewis D. Conta, Professor of Mechanical Engineering University of Rochester, Rochester, N. Y.
"Nozzle Design Cuts Locomotive Fuel Costs" by Walter J. Gewinner, Staff Assistant to Chief Engineer, American Bosch Division, American Bosch Arma Corp., Springfield, Mass.
"Design and Development of Turbochargers for the General Motors Corp. Series 567 Engines" by Albert N. Addie, Research Department, Electric-Motive Division General Motors Corp., La Grange, Ill.
"Piston Ring Design and Application Practice for Modern Large Bore Diesel and Gas Engines" by Fred A. Robbins, Manager, Sales and Engineering, and John W. Lippert, Project Engineer, Piston Ring Dept., Metal Products Division, Koppers Co., Baltimore, Md.

1:30 p.m.: Inspection Trips, TWA International Overhaul Base

WEDNESDAY, MAY 25

9:00 a.m. to 6:00 p.m.: Exhibit Open, Grand Ballroom

SESSION IV

9:00 a.m.: Trianon Room

Chairman: Robert J. Daverman, Partner, J. & G. Daverman Co., Grand Rapids, Mich.

Vice Chairman: R. L. Stanley, Executive Secretary, DEMA
"Cost Comparisons—Diesel and Steam" by S. K. Fosholt, Partner and Operations Manager, Stanley Engineering Co., Muscatine, Iowa.
"Power Cost Studies for Systems With Diesel Generating Stations" by William H. Reed, Engineer, Rural Electrification Administration, U. S. Department of Agriculture, Washington, D. C.

SESSION V

2:00 p.m.: Trianon Room

Chairman: F. L. Townsend, Sales Manager, Wm. W. Nugent and Co., Skokie, Ill.

Vice Chairman: W. M. Kauffmann, Chief Engineer, Engine Division, Worthington Corp., Buffalo, N. Y.
"A Laboratory Gas Engine Lubricant Study" by P. M. Coant, Senior Research Technologist, and L. W. Manley, Supervisor, Lubricants Development, Socony Mobil Oil Co., Research Department, Paulsboro, N. J.

Panel Discussion

2:45 p.m.: Trianon Room

"Preventive Maintenance of Internal-Combustion Engines by Spectographic Analysis."

Moderator: H. R. Sennstrom, Vice President, Engineering and Sales, American Bosch Arma Corp., Springfield, Mass.

Panel Members: J. W. Barna, Lubrication Engineer, Union Carbide and Chemical Co., South Charleston, W. Va.
A. C. Davis, Diesel Engineer, Standard Oil Co. of Indiana, Chicago, Ill.
Ray McBrian, Director of Research, Denver and Rio Grande Western Railroad Co., Denver, Colo.
R. A. Wells, Staff Products Application Engineer, Gulf Research and Development Co., Pittsburgh, Pa.

6:00 p.m.: Exhibitors' Social Hour (Ladies Invited), Exhibit Area

7:00 p.m.: Banquet, Colonial Room

Presiding: John C. Gibb, Senior Engineering Representative, Socony Mobil Co., Inc., New York, N. Y.

Toastmaster: Eugene L. Miller, President, Diesel Engine Manufacturers Association, and President, The Cooper-Bessemer Corp., Mount Vernon, Ohio.

Presentation of Awards

Principal Address

Speaker: Walker L. Cisler, President of the ASME, and President of The Detroit Edison Co.

THURSDAY, MAY 26

9:00 a.m. to 1:00 p.m.: Exhibit Open, Grand Ballroom

SESSION VI

9:00 a.m.: Trianon Room

Chairman: Robert Cramer, Jr., Assistant Chief Engineer, Murphy Diesel Co., Milwaukee, Wis.

Vice Chairman: O. H. Moore, Director, Operating Research, Tennessee Gas Pipeline Co., Houston, Tex.
"System Stability Analysis Including Governor, Engine, Generator, and Tie-Line Impedance" by Leo T. Brinson, Research and Development Section Head, Nordberg Manufacturing Co., Milwaukee, Wis.
George Parker, Special Projects Engineer, Woodward Governor Co., Rockford, Ill.
F. B. Rothe, Manager, Industrial Analytical Engineer, General Electric Co., Schenectady, N. Y.
"Development of a Speed and Load Sensing Governor" by George W. Taylor, Director, Manager Sales and Service, Woodward Governor Co., Rockford, Ill.
"Application and Range of the Tuned Housing Vibration Damper" by E. A. Moorehead, Design Engineer, The Cooper-Bessemer Corp., Mount Vernon, Ohio.

11:45 a.m.: Exhibitors' Social Hour (Ladies Invited), Grand Ballroom Exhibit Area

Scope of the "OGP"

THE OGP Division deals with internal combustion power producing or energy transforming machines of the reciprocating piston type and their auxiliaries, their design, construction, application and operation. In addition to diesel, gas and dual fuel engines, and reciprocating gasifiers, this naturally includes basic components and systems. It is also concerned with all kinds of complete mechanical systems for the production of power from combustible fuels carried on within a cyclic changing of volume. This includes crankshaft or free-piston engines creating energy in pressured gaseous forms; to mechanical energy; or combination units involving partial recovery of available mechanical energy in reciprocating sections and partial recovery in turbine or rotary machine sections. It also includes the auxiliary equipment needed for a complete internal combustion engine power plant. The Division likewise concerns itself with the characteristics and properties of fuels and lubricants, the materials used in engine construction, and the fundamental processes involved in engine operation.

"MUD" CARGO OF OIL RIG SUPPLY SHIP

A UNIQUE vessel whose main cargo consists of powdered "mud" is plying the waters of offshore oil fields in Venezuela's Gulf of Paria. Early last August, Terminales Maracaibo, C.A., Maracaibo, Venezuela, took delivery of the *Pamela* from the products division of the Todd Shipbuilders, Inc., Houston, Tex. Powered by a pair of 500 hp turbocharged Caterpillar model D-397 diesel engines, the *Pamela* will supply barium sulphate to offshore drilling rigs. In addition, she will carry fuel oil, water, food, deck cargo and passengers to the rig. Other novel features include a deck mounted crane with 40 ft. boom and equipment for providing towing service.

One of the fastest oil field supply vessels ever built in this country, the *Pamela* attained a speed of nearly 13 knots on loaded trial runs. She measures 145 ft. in length with a 33 ft. beam and has a molded depth of 14 ft. Displacement is 792 tons at 9 ft. 5 in. draft and she has a storage capacity for 55,000 gals. (220 tons) of fuel. The *Pamela* was designed by Philip L. Rhodes, New York naval architectural and marine engineering firm.

Main cargo of the *Pamela* will be approximately 335 tons (4500 cu. ft.) of barium sulphate carried in eight vertical storage tanks forward of the engine room. The barium sulphate is transported to the offshore rigs in dry form. At the rig it is pumped onto the drilling platform, mixed with water and introduced into the well as drilling mud. Filled by gravity or pressure, the *Pamela's* storage tanks are discharged by air pressure developed by a compressor driven by a GM model 6061 diesel engine power unit. A clutch attachment on this unit also drives the bilge and fire pumps. Enough air pressure is supplied by the compressor to lift the barium sulphate to a height of 70 ft. above the *Pamela's* waterline at the rate of over 140 tons/hr. Unloading operations are controlled from a panel on the forecastle deck.

Supply vessel *Pamela* on the Houston ship channel as she started her voyage to Venezuela. On the trip the *Pamela* carried a 63 ft. crewboat on her deck and towed a 600 ton cargo barge.

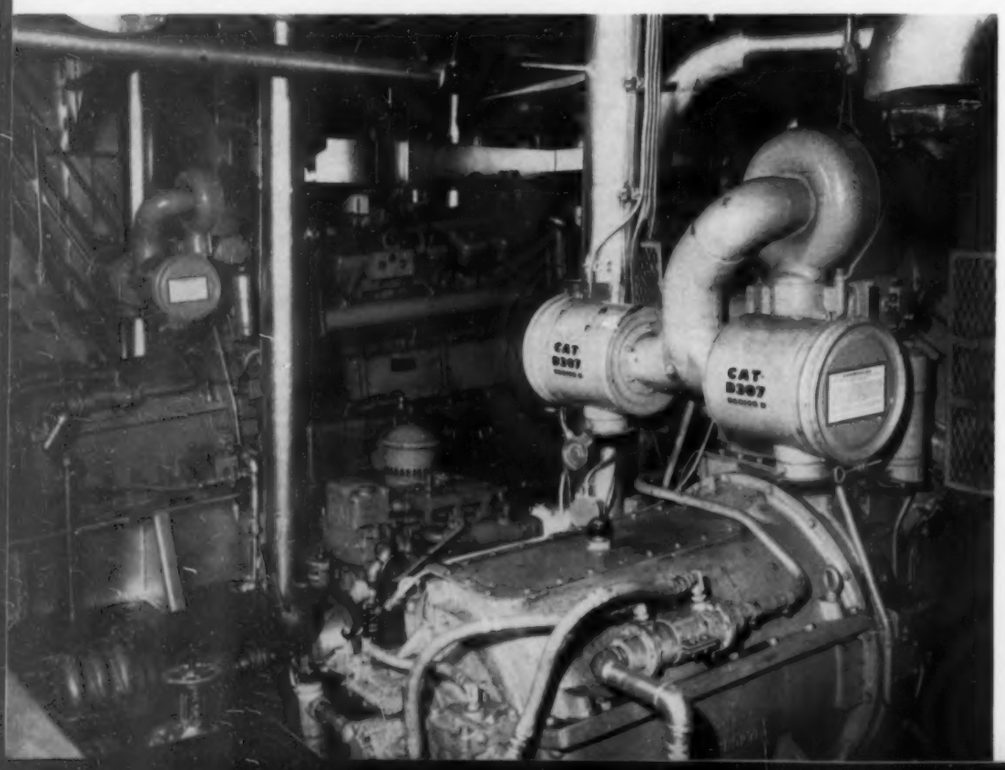
The two Caterpillar model D-397 propulsion engines are each rated 500 hp at 1200 rpm. Each drives a 62 in. Columbian Bronze propeller through a 3.68:1 hydraulic reverse and reduction gear. The 12 cylinder main engines have a bore and stroke of 5.75 x 8 ins. and are equipped with flyball type governor and overspeed control, low oil pressure and high temperature alarm system and dry type Purolator air intake filters.

The GM model 6061 power unit driving the mud delivery air compressor is rated 211 hp at 2000 rpm. Two model 3-71 GM diesel engines drive Delco 3064B generators each rated 30 kw, three phase, 60 cycle, ac at 1200 rpm for ship's auxiliary power. The 3-71 engines are equipped with hydraulic starters and low oil pressure and high water temperature alarm devices.

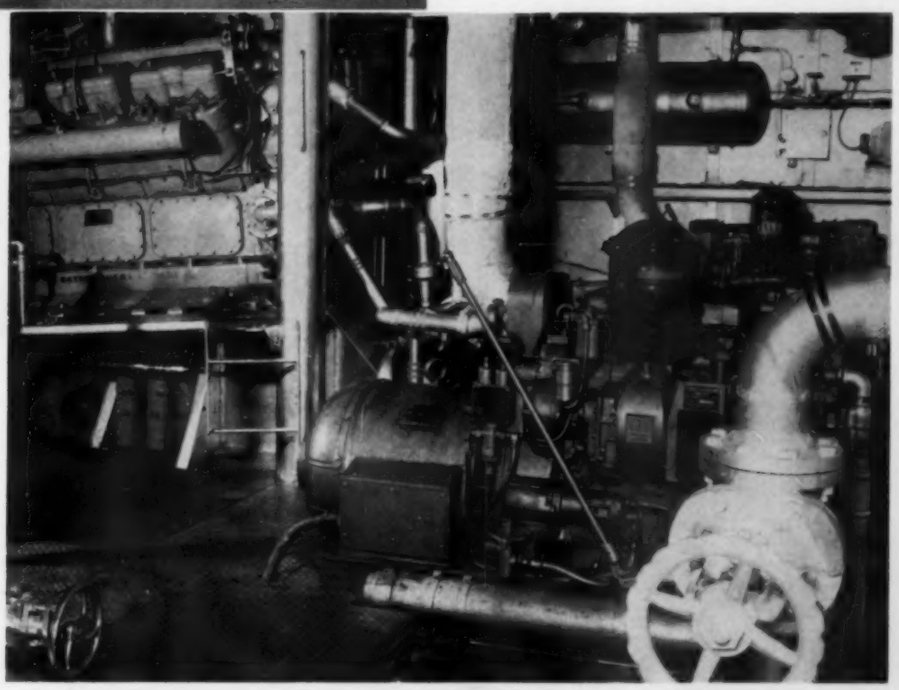
The *Pamela's* steel hull is subdivided into 13 watertight compartments below the main deck. Above the hull rises a steel forecastle with pilothouse forward, leaving the reinforced steel deck aft with ample storage space for carrying vehicles and up to 100 tons of pipe and miscellaneous deck cargo. The deck is reinforced to carry loads of up to 1000 lbs. per sq. ft.

On the main deck are the storerooms, three double staterooms, messroom, galley and bathroom facilities. Crew's quarters for eight men and engineer and captain are forward. The pilothouse of the *Pamela* is equipped with electro-mechanical steering stand, Morse engine room controls, 12 in. searchlight, chart table and ship-to-shore telephone. Steering apparatus consists of twin spade rudders actuated by an electro-hydraulic steering gear with auxiliary hand-powered gear for emergency use. The hull was sandblasted and painted with a four-coat system plus one coat of anti-fouling on the bottom to retard corrosion. In addition, 26 anodes were employed on the hull.

Aft end of the Cat main engines showing the hydraulic reverse-reduction gear, Garrett turbochargers and Purolator air filters. Between the two main engines is the GM 3-71 diesel engine which drives the mud delivery air compressor and bilge and fire pumps.



A pair of GM turbocharged 6-71 diesel engines gave this 52 ft. crewboat delivered recently to Terminales Maracaibo, C.A., a speed of 30 mph in trials. Seating capacity is 40 persons in the enclosed cabin. Boat has a welded steel hull, aluminum superstructure. A Rhodes design, it was built by Paasch Marine Service, Erie, Pa., and will be used on Lake Maracaibo transporting oil rig workers and equipment.



Athwartship view of engine room showing one of the two Caterpillar turbocharged D-397 propulsion engines and the two GM diesel driven auxiliary generator sets. Note Fulton Sylphon fuel shutoff controls, Donaldson air filters on electric sets.

This 63 ft. crewboat was carried "piggyback" to Venezuela by the *Pamela*. This craft is powered by a pair of GM 6-71 diesel engines. Designed by Philip Rhodes, it and a twin craft were built by Peterson Builders, Sturgeon Bay, Wis. The boat can carry 40 passengers in the enclosed cabin; cruising speed is 20 mph. Hull is of welded steel; superstructure is aluminum.

Terminales Maracaibo, C. A., is a Venezuelan corporation with capital assets of over $20 million, whose principal activities are at Lake Maracaibo where they provide towing and water transportation services and terminal facilities for oil companies and others. The *Pamela* will be operated under a charter to Paria Operations, Inc., in connection with development of a 152,000 acre concession in the Gulf of Paria between the Venezuelan mainland and Trinidad. Paria Operations is owned by five American oil companies: The Texas Co., Continental Oil Co., Cities Service Co., Richfield Oil Corp., and Ohio Oil Co.

At the same time the *Pamela* was delivered, Terminales Maracaibo also took delivery on a 12,000 bbl. flow barge, two 600 ton deck cargo and oil barges, two 63 ft. crew launches and two 52 ft. crew launches. On her maiden voyage from Houston and Port Arthur to the Gulf of Paria, the *Pamela* carried one of the 63 ft. launches on her deck and towed a 600 ton deck cargo barge.

Principal Equipment Supply Vessel *Pamela*

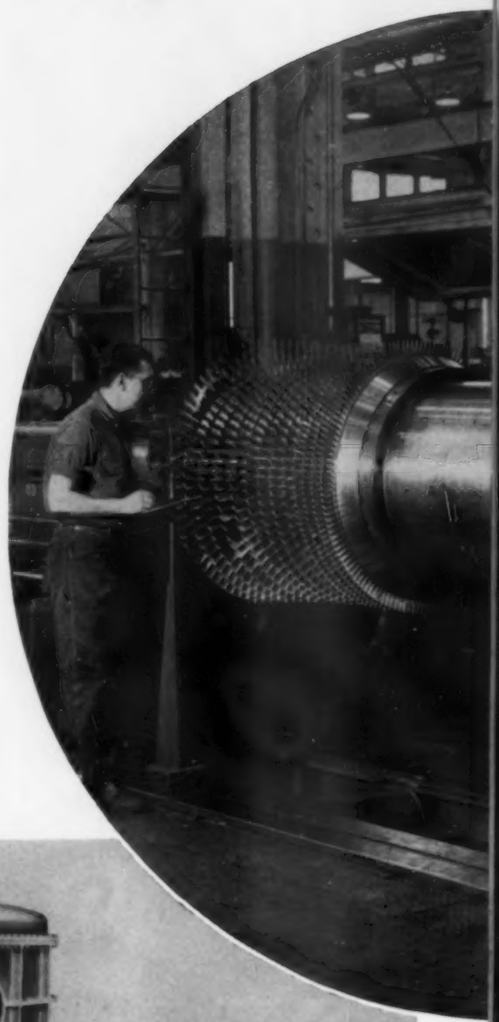
Main engines (2)	Caterpillar
Turbochargers	AiResearch
Fuel oil filter	CFC Fulflo
Fuel oil transfer pump	Ingersoll-Rand
Dry type air filters	Purolator
Lube oil filter elements	Purolator
Steering controls	Morse
Auxiliary diesels (2)	GM Detroit
Auxiliary generators (2)	Delco
Mud delivery compressor engine	GM Detroit

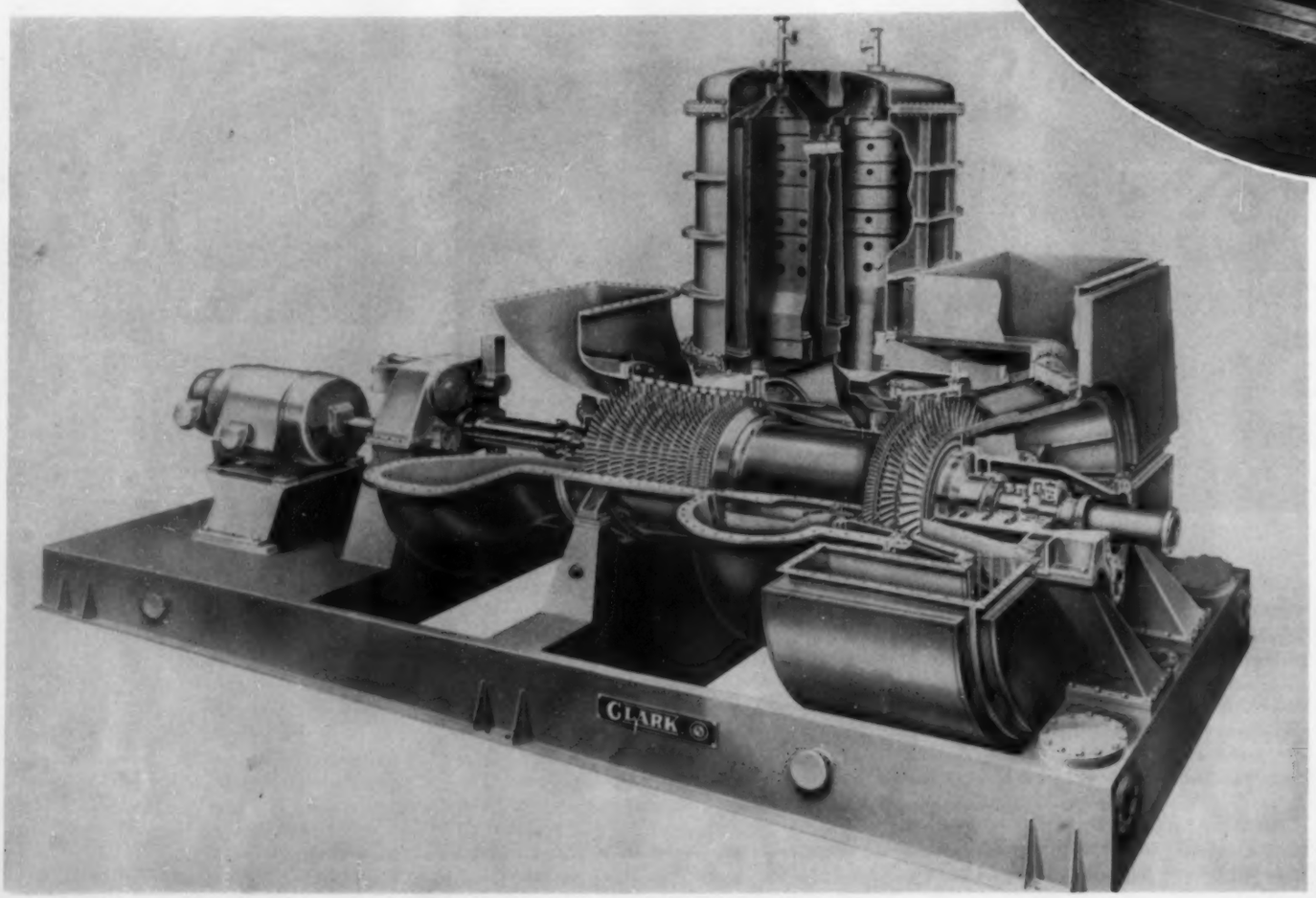
CLARK'S SINGLE SHAFT 9000 HP GAS TURBINE

New Heavy Duty Prime Mover Designed For Applications With Centrifugal Compressors, Power Generators And Liquid Pumps At Low Cost

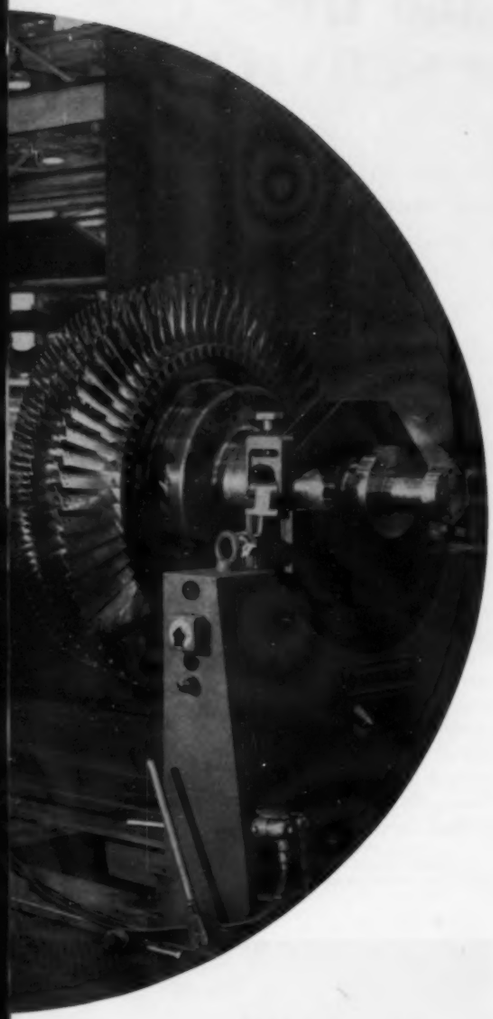
A NEW open cycle, single shaft gas turbine with a NEMA rating of 9000 bhp has been introduced by Clark Bros. Co. Designated model 305-S, this compact heavy duty prime mover has been designed to achieve substantial savings in initial equipment cost, transportation, floor space, foundation and installation expense. It burns either liquid or gaseous fuels and is reported to be capable of continuous operation under full load conditions at normal rated speed of 5000 rpm. In applications requiring limited speed flexibility, the 305-S is said to provide a low cost, reliable source of rotative power for centrifugal compressors, power generators and liquid pumps.

The simple Clark single shaft design has a minimum number of parts. It provides high rotating inertia to insure minimum speed variations under transient load conditions. At rated speed, the axial compressor delivers a mass flow of 135 lbs./sec. Turbine inlet temperature is held under 1400 degrees F. to insure extra long life and a substantial margin of operating safety. The turbine is completely air cooled—pressurized air is bled off the axial compressor to cool high temperature components, while cool air envelopes between inner and outer skin surfaces reduce heat loss and minimize external temperatures wherever possible. An optional air cooled lube oil cooler can be furnished to permit operation that is completely free of water requirements. Bearings, burners and rotors are readily accessible for in-





Cutaway view of new Clark single shaft gas turbine, rated at 9000 bhp. Unit is designed as compact reliable prime mover for centrifugal compressors, generators and liquid pumps.



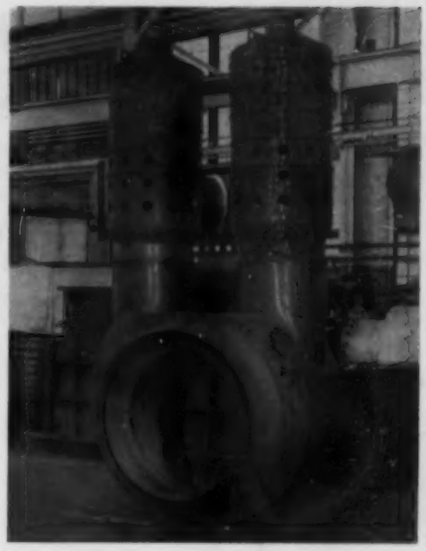
Dynamic balancing of complete rotor assembly for new turbine.

Control system for fuel oil firing.

spection or service, if required. A sliding support on the compressor end of the baseplate permits uniform expansion without affecting alignment. The axial compressor with rotor of built-up, forged steel disc design supplies compressed air to the combustion chamber. Arranged on a common shaft with the gas turbine, the compressor features horizontally split case and bearing housing for easy maintenance. The compressor is aerodynamically very much the same as the one used in the 9000 hp two shaft gas turbine built by Clark Bros. Co. This compressor was originally designed for free vortex flow and 50 percent reaction. However these features have been lost because of resetting the stator blades to increase weight flow and compression ratio. Other changes in the work distribution (unloading of the first stages) have been made recently. The weight flow of air is now 135 lbs./sec. at a compression ratio of 5.25 at the design point of 5000 rpm and for an ambient condition of 80 degrees F. and 14.17 psia.

A single combustion chamber assembly contains two parallel burners, each enclosed in a separate combustion liner of high temperature, nickel chrome alloy. It is mounted vertically over the intermediate shaft area for greater compactness.

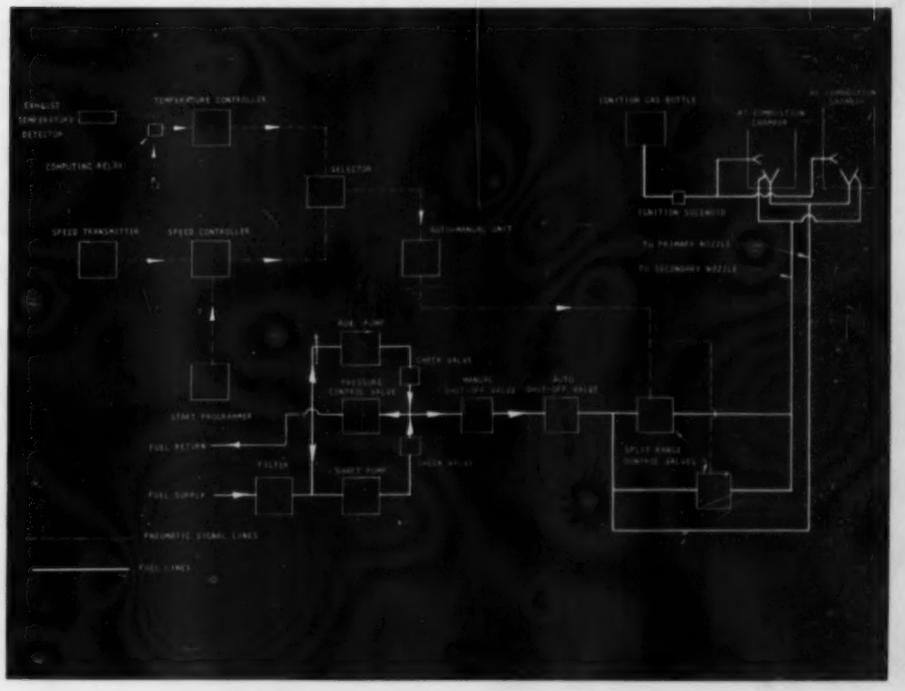
A three stage turbine is used and is designed with constant mean diameter through all three stages. The turbine blading is of the free vortex design with approximately 50 percent reaction at the mean diameter of the first and second stage. The third stage is less loaded than the two preceding ones, the degree of reaction being about 45 percent. The turbine, which supplies power to drive the compressor and load, incorporates a high efficiency volute and a rotor of built-up forged steel disc design. Renewable labyrinth strips or honeycomb seals are provided at all close clearance points on the turbine shaft to minimize leakage. Turbine rotor shaft bearings are of the babbitted, bronze-backed, replaceable, thick wall type. Turbine bearing supports are split on the horizontal center line permitting inspection or replacement of bearings without removal of rotor. All integral ducting is constructed to provide the most efficient and desirable flow of gases possible, and is readily removable for maintenance. Lagged insulation on the gas turbine exhaust minimizes heat radiation and provides maximum operator safety. Gas turbine control is achieved by regulation of the fuel flow rate and a pneumatic control system, furnished as standard equipment, is semi-automatic leaving some functions to the operator, especially during starting. However, all provisions for fully automatic remote control have been made. The standard semi-automatic system provides for: 1—Semi-automatic starting and shutdown; 2—Automatic control of output speed and horsepower, in response to load requirements; 3—Automatic limiting of maximum turbine inlet temperature, and, 4—Automatic overspeed trip device for safety shutdown. In addition, automatic safety shutdown devices protect both the unit and the operator against low lube oil pressure, low instrument air pressure, loss of control power, high inlet temperature, loss of flame, low fuel pressure and high bearing temperature.



Combustion chamber liners and volute. Two parallel burners are mounted in a single combustion chamber shell assembly.

The Clark 305-S gas turbine is mounted on a fabricated steel baseplate of box type construction for maximum strength and rigidity. The frame contains an integral lube oil reservoir and is long enough to provide adequate mounting for the starting device and other accessories.

Depending on requirements, alternate starting devices such as electric motors, steam turbines, diesel engines, etc., can be provided. The turbine is furnished with its own integral force feed lubrication system.



COOPER-JARRETT PUTS 380 HP HENDRICKSONS IN TANDEM SERVICE

Chicago Trucker Installs 12 Cylinder GM V-71 Diesels in Two Tractors Operating on Indiana-Ohio Turnpikes. One of the First OTR Applications of This 380 HP Diesel

WHEN the Indiana and Ohio Toll Road Commissions recently increased the allowable limits on length and weight for tandem-trailer units over a six-month period starting January 18, they posed some difficult equipment procurement problems for freight haulers wishing to participate in the program. The Turnpike authorities had authorized loads up to 127,400 lbs. in tandem-trailer combinations up to 98 ft. in length and had set up additional speed, axle, braking, lighting and other requirements to fully safeguard the operation of the longer, heavier combinations.

Cooper-Jarrett, Inc., of Chicago, was one of the first companies to get double-bottoms rolling over the 397-mile combined turnpike route. Although the company operates approximately 140 diesel tractors on conventional freight runs, it was deemed necessary to go to custom-built units to obtain equipment that would readily meet all turnpike regulations. It was important to get this equipment in operation as soon as possible in order to compile adequate efficiency and performance data prior to the expiration of the trial period.

As late as January 5, Copper-Jarrett placed an order with Hendrickson Manufacturing Co. of Lyons, Ill. for two of its custom tandem axle model BD-420-F6 COE tractors. Selected for power were two 380 hp GM series 12V-71 diesels—one of the first applications of these 12-cylinder units in over the road service. These two-cycle, naturally aspirated V-type engines incorporate the 4-valve-head design, have a bore and stroke of 4½ by 5 ins., a compression ratio of 17:1, and gain their rated horsepower at 2100 rpm.

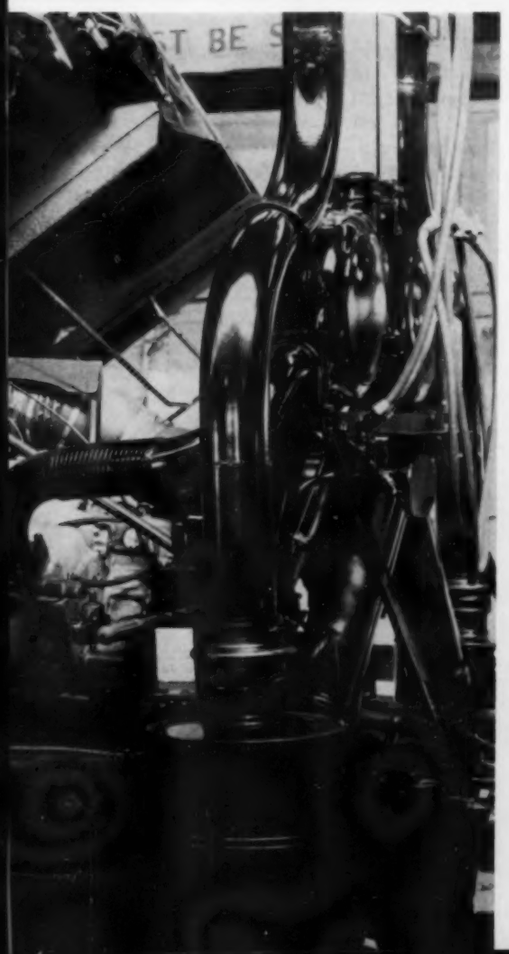
With delivery of the GM diesels scheduled for two weeks, Hendrickson went to work at once incorporating the extra safety features with respect to brakes, steering control, suspension transmission, lights, etc. into the tractor's design. The 12V-71s were installed with 15½ in. two-plate Spicer clutches and Fuller R-1160 RoadRanger nine-speed transmissions including overdrive. The tractors were also equipped with Timken FE-900 front axles and Eaton 38 DSA tandem rear axles. Twelve-volt electrical equipment on the new Hendricksons is Delco-Remy with a 12-24 series-parallel switch for 24 volt starting.

Just seven weeks from the order date, the first truck was delivered to Copper-Jarrett and at 12:30 p.m. on Mar. 1 the company's first double-bottom unit with full allowable load entered the West entrance of the northern Indiana Toll Road. The second unit has since been completed by Hendrickson and put into operation, thus providing simultaneous two-way operations. The two new vehicles increase Copper-Jarrett's OTR fleet to

Space for break-up and assembly of tandem units is provided at Interchange 15 and at other points along the two turnpikes. Note dual intake air and exhaust systems for the 12-cylinder GM diesel on the Hendrickson.

The 380 hp Cooper-Jarrett double-bottom driven by Earl Hamilton westbound on the Ohio Turnpike. Schedule is maintained by averaging 45 mph.

The Hendrickson COE with cab tilted showing 380 hp GM diesel power plant. Drive is through a Spicer 15½ in. clutch and 9 speed Fuller transmission. Dual Donaldson air filters are installed, each serving a six-cylinder bank.



142, all of which are powered with GM diesels. The overall length of Cooper-Jarrett Turnpike cruisers approximates 98 ft. which compares with the previous turnpike limit of 60 ft. per tractor and trailer combination. Regulations in regard to speed call for a minimum of 25 and 30 mph on all grades for the Ohio and Indiana Turnpikes, respectively. A minimum of 40 miles per hour for on-the-level road speed has been established, but Cooper-Jarrett units with full allowable loads have averaged 45 or more miles per hour over the entire distance. The steepest grades are taken at about 38 mph while the allowable top speed of 55 mph is easily maintained.

The overall length and weight of vehicles permitted on the turnpikes do not, of course, apply to highways leading to the turnpikes. It is necessary to "ferry" the trailers to and from the turnpikes in accordance with length and weight limitations ordinarily in force. Break-up and assembly space is provided at turnpike entrances and exits as required. The Cooper-Jarrett run extends from the West entrance of the Northern Indiana Turnpike to Exit 15 on the Ohio and return. From Exit 15 the trailers are moved individually to a distribution point at Somerset, Pa., and thence to ultimate shipping points. From the Chicago exit trailers are ferried 12 miles to the Cooper-Jarrett terminal on W. 73rd St.

Although beset with extraordinarily bad driving weather throughout the month of March, Cooper-Jarrett is confident at this time that the experiment made possible by the turnpike authorities will point the way to increased efficiency and a faster movement of high volume freight to and from their eastern terminals. And this, according to Cooper-Jarrett, justifies their participation in the program which, they hope, may result in a continuation and possibly expansion to other selected highways throughout the country.

Product view of the GM series 12V-71 diesel rated 380 hp at 2100 rpm. Engine is two-cycle, naturally aspirated.

With the tandem dolly in position, driver directs hook-up operation.

PORTABLE DIESEL-ELECTRIC PLANTS HELP LIGHT LIBERIA

PORTABLE diesel-electric plants are spearheading Liberia's electrification program. Monrovia, capital and chief seaport of the African west coast nation, has experienced explosive growth in the last ten years, with demand for power outstripping generating facilities. In addition, rural areas of this 43,000 sq. mi. country are in much the same situation that prevailed in rural America before the REA program was started in the 1930's. The administration of President William V. F. Tubman is determined to achieve complete electrification.

It was natural that Liberia should turn to the United States for equipment to meet its power needs. Ties between the two nations have been close for more than a century and Liberia is the only African country standardized on American voltages and 60 cycle current. About two years ago, Stanley Engineering Co. of Muscatine, Iowa, was commissioned by the International Cooperation Administration of the United States to study Liberia's power requirements and generating potential. As a result of the survey, Liberia received a $7,265,000 loan from the Export-Import Bank to start the power development program.

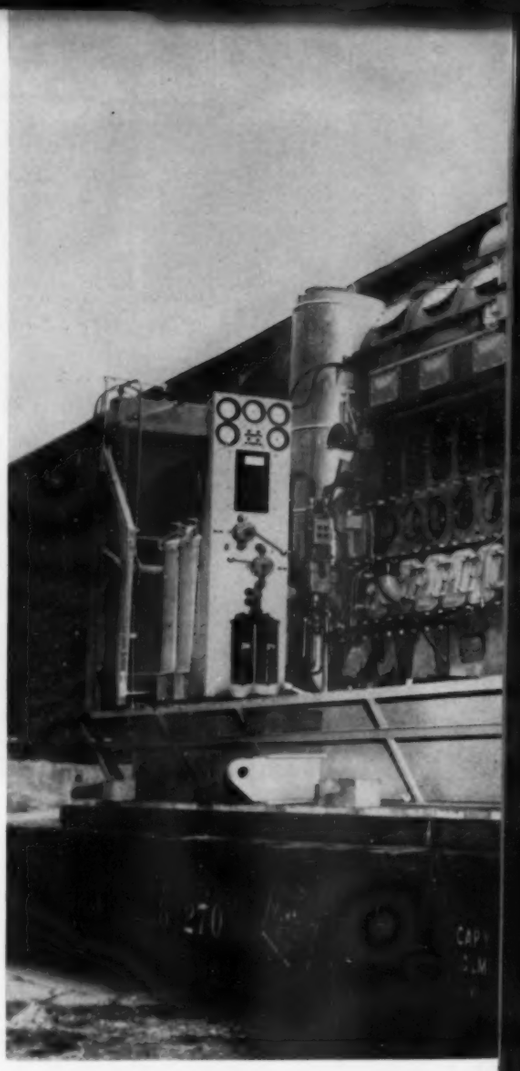
First order of business was procurement of portable plants to meet emergency needs in Monrovia. The spectacular population growth stretched power generation and distribution facilities to such an extent that in many areas voltage could not be maintained. But however urgent the need, economic and engineering considerations dictated careful design of efficient, heavy-duty generating units. These plants would be called on for years of central station service followed by many more years of pioneering and trouble-shooting as the electrification program progressed. And, on January 4th, three portable power plants, designed and built by Fairbanks, Morse & Co., helped light up the capital of Liberia for a dual inauguration: the fourth inauguration of President Tubman, and inauguration of the African republic's new electric power expansion program.

The new power packages, designed at F-M's Beloit, Wis., Works are notable on several counts. They are among the largest portable diesel-generator plants built, with one rated for continuous service at 900 kw, the others at 560 kw. They are completely self-contained with all accessory and control equipment included in a skid-mounted package. There is even a built-in fuel day tank large enough for eight hrs. of full-load operation. It is only necessary to attach three wires to carry generator output to an electric distribution system. Still another feature is the compactness of this heavy-duty diesel plant. The 900 kw plant, incorporating a 1280 hp Fairbanks-Morse opposed- piston diesel engine, is just 32 ft. long, 8 ft. 6 in. wide, and 11 ft. 9 in. high, and weighs a total of only 82,000 lbs. The 560 kw unit is 27 ft. 7 in. by 8 ft. 6 in. by 11 ft. 4 in. and weighs 58,000 lbs.

For the first phase of their dual life, all three units were put to work in the capital city. Two were located in the Sinkor and Congotown areas of Monrovia. The third was spotted near the existing Krutown power station to augment that plant's output. The portable units will remain in these locations for about two years until a permanent new generating station is completed and put into service. Then they will go traveling to smaller towns and rural areas, easing power shortages in growing communities, bolstering voltage where systems are overburdened or distant from adequate supply, bringing electricity to some areas that have never known modern light and power.

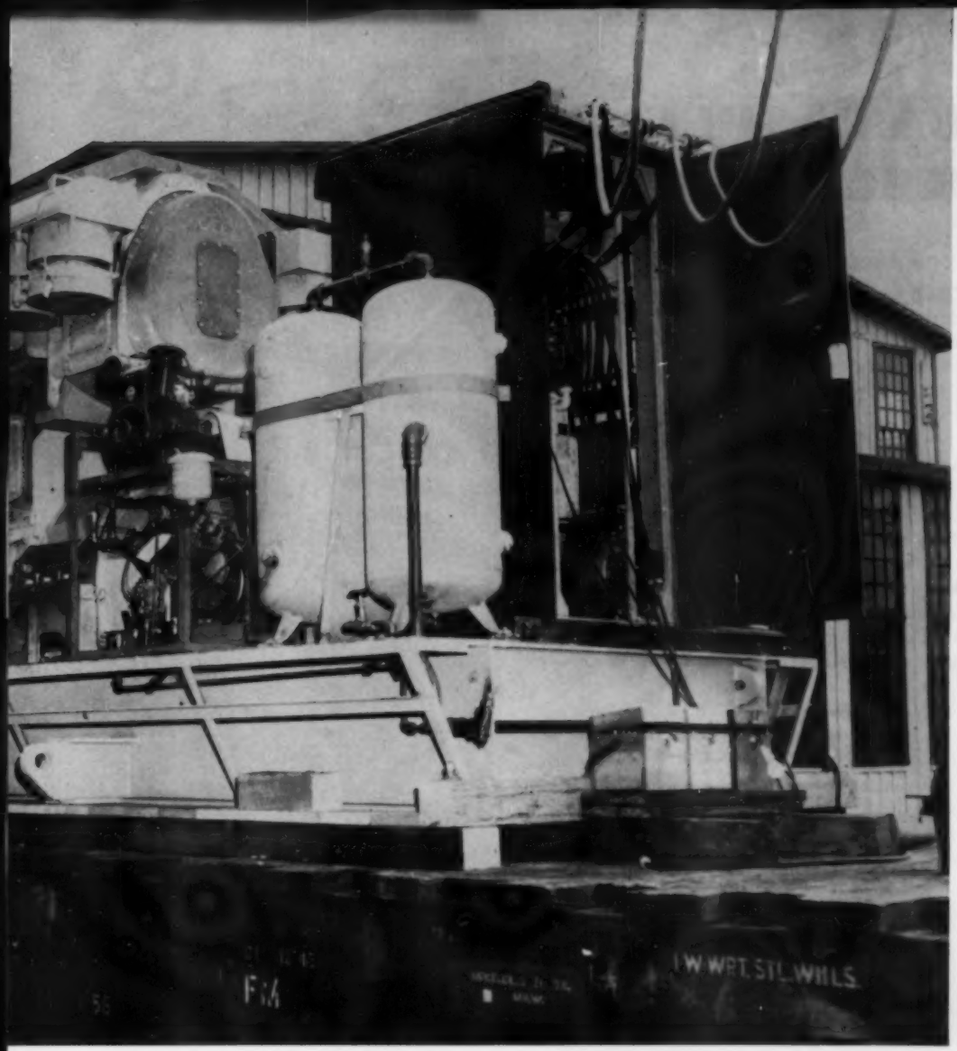
The portable plants designed for this varied, arduous service are built around the Fairbanks-Morse opposed-piston diesel. The new 900 kw portable utilizes an 8 cylinder model 38D8-⅛ engine rated 1280 hp at 720 rpm with 8½ x 10 in. bore and stroke. It drives a 900 kw Fairbanks-Morse generator which has a belted exciter mounted on the generator frame. The smaller plants have 5-cylinder opposed-piston diesels rated 800 hp at 720 rpm, driving 560-kw generators. Cooling water is circulated by an engine-driven centrifugal pump through finned tubes of a radiator; the radiator fan is driven by an extension of the engine crankshaft. The jacket water also flows through a single-pass shell-and-tube lube oil cooler. The lubricating oil is circulated through the engine, oil cooler, full-flow strainer, and cartridge-type by-pass filter by a built-in engine-driven pump.

Four oil-bath air filters, draped like saddlebags over the engine's built-in blower, clean scavenging air for the two-cycle diesel. Exhaust gases vent through a pair of vertical snubbers with insulated sheet metal covers. Starting air is provided by a



V-type compressor driven by a gasoline engine mounted on an open frame over the compressor. Compressed air is stored in a pair of vertical cylindrical tanks. The space between the heavy skids has been used as a fuel day tank, holding 550 gallons on the large unit and 350 gals. on the smaller plant. In both cases, this is enough for more than eight hrs. of full-load operation. Three 2,000 gal. fuel storage tanks were provided. Included in the fuel system of each portable plant are a meter

On arrival at Monrovia, the packaged power plants were trucked to their initial assignments. This is the 900 kw plant.



One of the 560-kw Fairbanks-Morse portable diesel power plants is shown in test operation at the Beloit factory prior to shipment to Liberia. Prime movers in all three plants are F-M opposed-piston diesels. Note Air-Maze air filters, Westinghouse Air Brake starting air compressor.

and a duplex filter. Because of the problem of moisture condensation and Liberia's humid climate, the plants also have been provided with fuel centrifuges.

A panel convenient to the control end of the engine holds pressure and temperature gauges and a multi-point exhaust pyrometer, also an inset alarm panel to warn of low lube pressure or of high lube or jacket water temperature. The board also is equipped for synchronization so these plants can be paralleled with each other or with other generating units. All electrical equipment in the plants is of a fungus and moisture-resistant type. Every piece of equipment is easily accessible for servicing, and conveniently placed for operating. Special couplings were used in the piping both to permit expansion and for easy disassembly. The plants were shipped by rail from the factory at Beloit, Wis., and at Brooklyn were lifted aboard the *S. S. African Grove* for the three-week trip to Monrovia.

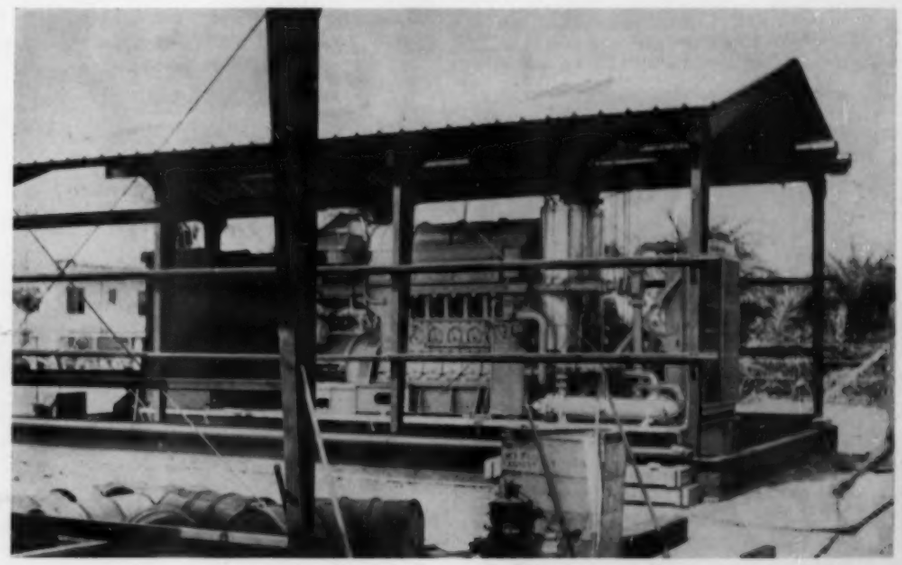
These plants needed no elaborate foundations. All the engineers provided was a pair of level two foot trenches filled with crushed stone. For their two year run in Monrovia, the plants were housed in pre-fabricated steel buildings, also shipped over from the United States. Fairbanks-Morse engineers believe the new compact, efficient, heavy-duty diesel-generating plants will prove useful not only in other power development programs abroad but to public and private electric utility systems in the U. S. as well.

In the compact box on the flatcar is a complete, self-contained, portable Fairbanks-Morse 560-kw diesel-generating plant ready to be hoisted aboard the S.S. African Grove for shipment to Liberia.

Principal Equipment F-M Portable Power Plants

Engines	Fairbanks-Morse
Generators	Fairbanks-Morse
Governors	Woodward
Radiator	Yates-American
Thermostatic valves	Amot
Lube strainer elements	Air-Maze
Lube filters	CFC Fulflo
Fuel filters	Purolator
Fuel centrifuges	DeLaval
Fuel meters	Bowser
Air filters	Air-Maze
Exhaust snubbers	Burgess
Exhaust pyrometers	Alnor
Starting air compressor	Westinghouse Air Brake Co.
Engine panel	Fairbanks-Morse
Switchboard	General Electric

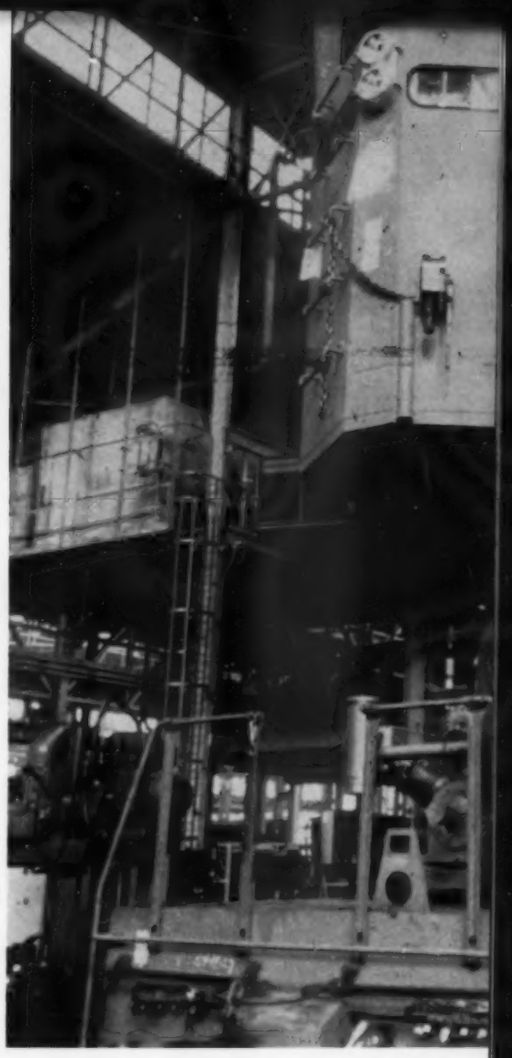
The two 560 kw plants were placed in Monrovia's Sinkor area and portable steel building set up around them.



52 GP9'S INCREASE SPEED, CUT COSTS FOR RAILROAD

Milwaukee Road Locomotives Replaced Older FT Units, Add Versatility To Line's Operations

By ANTHONY A. ALBERTE



MORE horsepower per unit has increased freight train speed and tonnage handled for the Milwaukee Road while cutting maintenance costs. In addition, 52 Electro-Motive GP9's delivered last year have added versatility in locomotive availibility.

Those are some benefits of locomotive renewal as reported in a recent interview with F. A. Upton, the line's superintendent of motive power, and Robert Maas, supervisor of diesel reclamation and maintenance at their Milwaukee office recently. The Milwaukee Road bought the GP9's in an $8.5-million improvement program, bringing to 166 the number of such units owned. These are part of a fleet of 812 diesel-electric locomotives, a list that includes 418 freight and road switch diesels averaging 1625 hp and 25,250 mi./yr; 301 switch and transfer units averaging 1100 hp and 67,385 mi./yr and 93 passenger units averaging 1875 hp each and 160,500 miles each year. The Milwaukee Road also operates 98 electric locomotives in the western section of the line.

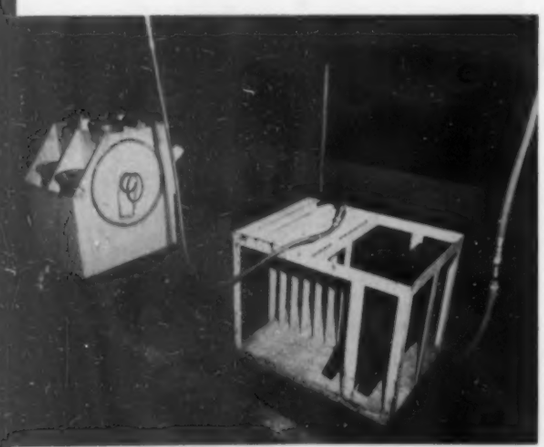
"With the GP9's, freight schedules on one typical run have been cut one day while on another run we have been able to replace four FT units with three GP9's maintaining the same schedule with increased tonnage," said Upton. Time freight speed is now often at the maximum of 60 mph. And, since schedules can be shortened (because of higher horsepower) and layovers lengthened, some of the GP9's can be used as switchers to eliminate former switch locomotives.

The GP9 is a general purpose, 1750 hp unit built by the Electro Motive Division of General Motors. EMD started producing the GP9 in 1954 under their locomotive renewal plan. The new Milwaukee Road units are 56 ft. 2 in. long, stand 15 ft. 2 in. above the rails and are 10 ft. 3 in. wide over the handrails. Weight ready for service is 249,000 lbs. Fuel tank capacity is 1700 gals.

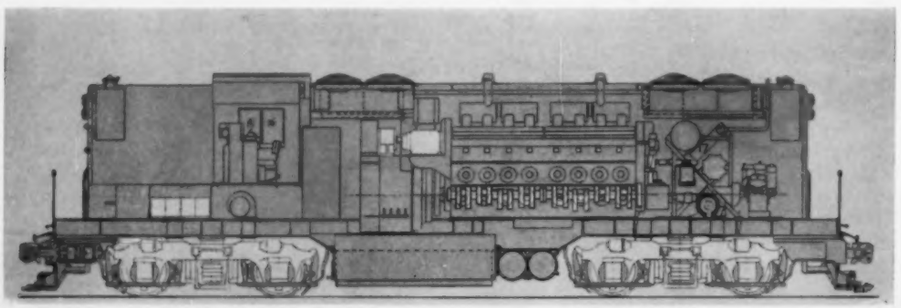
The EMD renewal plan involves conversion, in this case, of the older FT 1350 hp locomotive to increase horsepower and allow greater versatility. Ten components, in the case of the Milwaukee Road units, were used in the renewal. Re-used from the old FT's were auxiliary generators, batteries, injectors, crankshafts, harmonic balancers, trucks, traction motors, lube oil pumps, water pumps and engine blowers. Remanufacturing brought these components to present day new equipment specifications. For instance, the old trucks were reworked to include improved brake rigging, gear cases, sand guide castings, triple coil springs, new pedastal liners and brake stabilizers. Traction motors were rebuilt into EMD's new D-47-D motor. Aside from the items listed, everything else on the GP9 is newly fabricated. (The complete EMD renewal process is described in DIESEL AND GAS ENGINE PROGRESS, November, 1958 and May, 1957)

Prime mover in the GP9 is the GM 16-567C diesel engine rated 1750 hp. The 2 cycle, V-type engine with bore and stroke of 8½x10 in. is governed for idling speed of 275 rpm and 835 rpm full throttle. The engine drives, through direct coupling to the crankshaft, an EMD D-12-B generator with 600 volt nominal rating and, at the front, a 10 kw auxiliary generator. Four D-47-B traction motors, two for each set of trucks, are supplied from the main generator. The motors, each with 600 hp nominal rating, turn the four pair of 40 in. wheels through 62:15 reduction gears to give the GP9 a maximum speed of 65 mph and minimum cont. speed of 8 mph. The traction motors can be excited to provide dynamic braking to slow the train on downhill movement without using the brakes with resultant wheel and brake shoe wear.

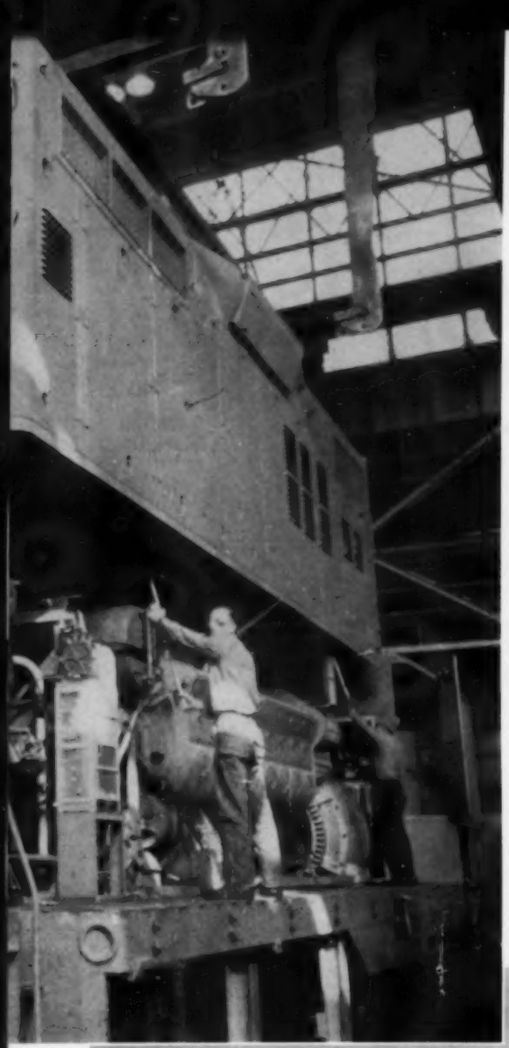
Milwaukee Road uses all the new GP9's in freight service on either of two main-line freights: a 2600

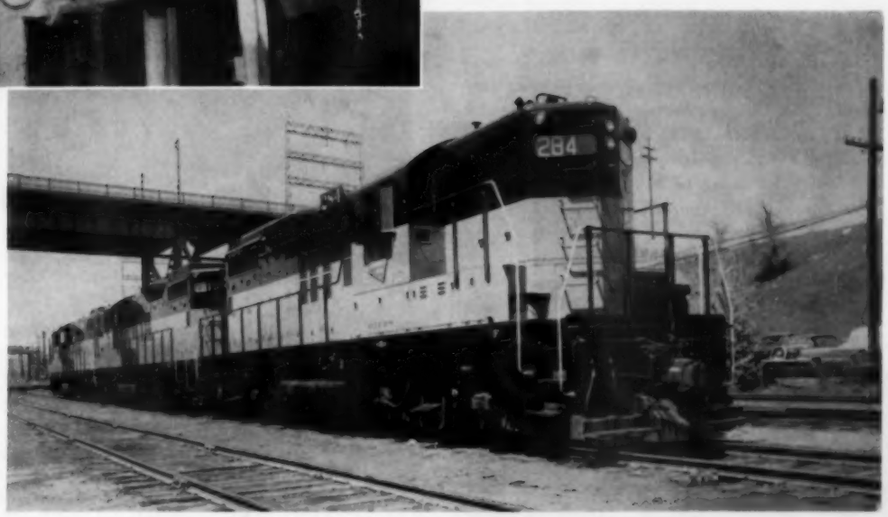


Carts for lube oil filter elements and panel filters help speed maintenance operations for the Milwaukee Road. Hoses are for air, water used by service personnel.



Light areas show parts reused from older FT locomotive units in building GP9. All other components of locomotive are new.





mi. run from Milwaukee to Harlowton, Mont., via St. Paul, Aberdeen and Miles City; or on the Milwaukee-Kansas City run via Savanna, Ill.

"On the Milwaukee-Harlowton run, use of the GP9 has cut one day from the old schedule", said Upton. "With F7's and F9's, the trip took the better part of five days and any given consist of five units (8000 hp) left every six days. Now five unit consists (8750 hp) of GP9's hauling an average of 6500 tons west of Milwaukee and 4000 tons west of Minneapolis have cut the time to four days with any given consist ready every fifth day." The five-unit consist is used in winter, summer consists are made up of four units.

On the Milwaukee-Kansas City run, Milwaukee Road uses the GP9's greater tractive power (50,345 lbs. at 8 mph) to increase speed and capacity of the run without changing schedules. On this run, consists of three GP9's haul as much freight as four FT units. Trains average just under 4500 tons between Milwaukee and Savanna and just over that figure from Savanna to Kansas City.

Forty-six of the Milwaukee Road GP9's are maintained at the Milwaukee diesel house and after each trip go through a "one spot" maintenance check. Here mechanics inspect each unit from truck to exhaust stack to make sure it will stay in service when it goes back on the line. Progressively increased checks are given at regular intervals to coincide with Federal inspections. Engine overhaul (reseal) is scheduled at three years or 540,000 miles, said Maas, and engine changeout done after three reseals.

In the "one spot" check, inspectors examine motors, brakes, apply lube oil to trucks, blow out electrical cabinets; check generator brushes, check lube oil, engine governor, water and battery water.

The new engine hood, with its self-contained cooling system and dynamic brake is lowered into position during assembly at Electro-Motive plant. Engine is GM 16-567C, rated 1750 hp.

The Milwaukee Road GP9's replaced older FT locomotives. New units are more versatile, being suitable for road freight or passenger service and switching.

They sample and test the lube oil, change filters if due, clean lube strainers, check battery charging circuits, change fuel filters if due; check the spare fuse supply and give the unit a throttle test. Necessary lube oil is piped to stations on the service line and extra brake shoes are spotted at intervals so mechanics can spend their time on the maintenance operation instead of "chasing" materials.

Both F. A. Upton and Robert Maas credited modern design features of the new locomotives for cutting running maintenance and overhaul costs. Features they cite include the following; use of two 48 in. cooling fans instead of four 36 in. on old models, increased capacity ac contactors requiring less maintenance, magnetic switch gear which replaces the old air control system and eliminates frequent leakage tests, oil bath air filters on the engine which reduce maintenance of impingement panel filters; elimination of sintered bronze fuel oil filters with a single pair of woven filters and roller type control switch which reduces need for frequent lubrication and attention to the older finger type controls.

Overhaul maintenance time and costs reductions have been found in the following equipment: inlet baffle to oil cooler which keeps cooler clean and extends service life; water cooled air compressor which operates at reduced temperature extending service life; coil spring type accessory drive gear which does not require periodic inspections and will safely operate between engine overhauls; new poly-dyne camshafts which are expected to cushion valve operation and extend valve life; double liner seals and solid liner pilot rings which reduce escape of air box pressure into the crankcase and resulting crankcase pressurization with excessive lube oil leakage.

Milwaukee Road buys grade "C" diesel fuel from refineries according to test department specifications. Summer specs are: 40 cetane minimum, .50 percent sulphur maximum, .05 percent water maximum, 32-45 seconds viscosity at 100 degrees F, and 145 degree minimum flash point.

Principal Equipment Milwaukee Road GP9's

Engine	Electro-Motive (GM)
Lube oil filters	CFC Fulflo
Lube oil coolers	Harrison
Air intake filters	Air Maze
Governor	Woodward
Traction blower motors	Delco
Switch Gear	Allis-Chalmers
Brake air compressor	Gardner-Denver
Compressor air cleaner	Vortox

View of "one spot" maintenance line at Milwaukee Road diesel house in Milwaukee. Materials required for routine maintenance are spotted at intervals to save labor time.

1460 HP FLOATING AGGREGATE PLANT

New Dredge Can Process Four Grades of Aggregate; Load Four Barges At the Same Time; Has Two Cooper-Bessemer 730 HP Engines Driving Westinghouse Generators

AGGREGATE suppliers, faced with changing markets and specifications for quality concrete aggregate, have found that older equipment, suitable for the job only a few years ago, just can't turn out the quality and quantity of material demanded by new developments in today's market. The Dravo Corp., of Pittsburgh, was somewhat discouraged by the view ahead when it took stock of its aggregate production facilities in 1957. Dredging and production equipment rapidly approaching obsolescence would soon be unable to meet tightening specs and long-range possiblities of keeping abreast of quality and quantity requirements with existing equipment looked even worse.

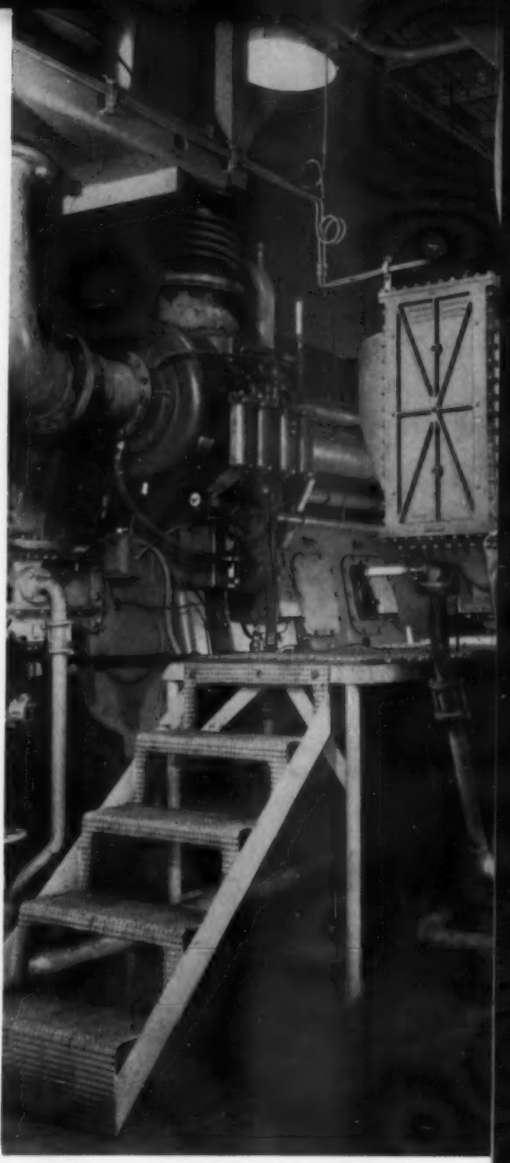
Dravo engineers studied their equipment and decided that neither modernization of older dredges or building a land-based processing plant would provide an economical answer to the problem. The solution, they decided, lay in a completely new dredge which would be designed to meet the demands of today's market as well as those in the foreseeable future.

Now, as a result of its studies and recommendations, one of the largest sand and gravel producing dredges on the nation's inland waterways is nearing completion of its first year of operation for the Dravo Corp.'s Keystone Division. The $2-million dredge is 201 ft. long, 53 ft. wide and as high as a six-story building. It was placed into operation last July on the Ohio River below Montgomery Dam. Complete with its own heavy media plant, impact crusher and scrubber, *Dredge 16* can produce four different grades of aggregate—sand and three grades of gravel—at the same time and at the rate of 500 tons/hr. And it has also been designed to load four barges at once with the same or different grades of aggregate.

Power is supplied by a pair of 500 kw diesel-electric sets and the dredge is equipped with 100 ft. long bucket ladder to reach the bottom of sand and gravel deposits in the river bed.

Dredge 16 replaces the smaller and older of two Keystone units. The old dredge had been in use for 30 years and could turn out only three grades of aggregate and had no crusher. Larger sizes of aggregate previously wasted by the old dredge can be crushed and screened into desired grades. Impurities such as stones and sticks and other undesirable objects are removed during processing making it possible to utilize deposits that had to be left untouched for years because of the difficulty of converting them into quality materials.

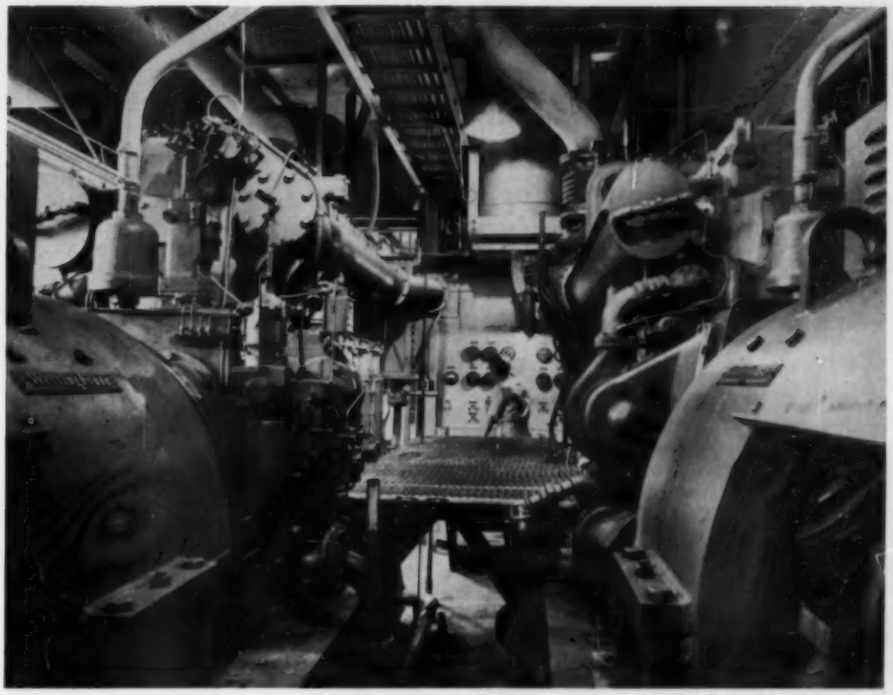
Prime movers on the *Dredge 16* are two Cooper-Bessemer diesel engines driving Westinghouse generators. The Cooper-Bessemer engines are model FW6T, turbocharged, and rated 730 hp at 900 rpm. The FW6T is a six cylinder, four cycle diesel with bore and stroke of 9 x 10½ in. They are direct connected to Westinghouse 500 kw, 250 volt direct current generators. Since the electrical load capacity is now 700 kw, there is ample reserve for future equipment. Auxiliary power is supplied by two GM diesel-generator sets: one 50 kw set and another 20 kw unit driven by GM series 71 engines at 1200 rpm.



The 201 ft. long Dravo *Dredge 16* splashes into the Ohio River at its launching last year. The vessel can produce four different grades of aggregate simultaneously at the rate of 500 tons an hour.

Power from the main generators drives the dredging and processing equipment on the Dravo dredge. This equipment includes the 100 ft. digging ladder, which is powered by a 200 hp electric motor with adjustable speed drive and Twin Disc 27 in. fluid coupling; the bucket elevator, driven by a 100 hp motor also with adjustable speed drive; the heavy media separation equipment which includes a 10 x 10 ft. drum with 10 hp motor; a 3 hp unit on the magnetic separator, 50 hp drive on the media pump. The belt conveyors are driven by eight motors of 10 and 15 hp. In addition, power is supplied to a 125 hp motor on the sand scrubber; two 25 hp motors on the sand screws; a 150 hp motor on the crusher and five motors of 10 and 20 hp on the vibrating screens. The dredge can run at a reduced production rate should one of the generator sets be down for any reason. The 50 kw auxiliary is used to supply power for lifting one spud, moving a barge capstan or running the fire pump at night by the watchman without starting the main diesel generators. The 20 kw electric plant provides for watchman lighting at night.

The two Cooper-Bessemer FW6T turbocharged engines on the *Dredge 16* develop 730 hp at 900 rpm. Note Young intercooler, CFC Fulflo lube oil filter and turbocharger lube filters.



The two Cooper-Bessemer engines drive Westinghouse 500 kw direct current generators to produce main power for *Dredge 16* operations. Note Woodward governor, Amot shutdown controls.

The dredge operator can anchor the dredge in up to 60 ft. of water by means of the 72 ft. individually controlled spuds, maneuver into a new position using 1800 ft. shore cables and handle from four to 20 barges around the dredge at one time. After loading into four barges, empties can be shifted into position by the operator.

Dredge 16's 100 ft. digging ladder allows operations down to the present 40 ft. maximum river depth plus a 10 ft. reserve to allow operating in deeper pools which might be formed by future higher dams. The dredge digging operator has a clear view of digging and conveying and can remove foreign or large particles from the buckets.

Dravo's engineers said they believe this is the first installation to use the heavy media separation (H.M.S.) media recovery screens for triple purpose. First they are used continuously for graduations with three decks. They can also be used for media recovery in conjunction with the H.M.S. plant or, with bypassing of the H.M.S. vessel, the screen pans may be sent to waste and used as a simple washing and grading screen. Also, one of the parallel screens can be run H.M.S. and the other for washing simultaneously. All the H.M.S. equipment was kept above decks for ease in cleaning around the pumps and other equipment. The sink-float partition of the screen is portable and could be moved laterally if the proportions of the sink and float would change appreciably over a period of time. For cold weather operations a system of metal windbreakers and a steam pipe loop along the conveyor has provided enough heat to allow operation down to 10 degrees F.

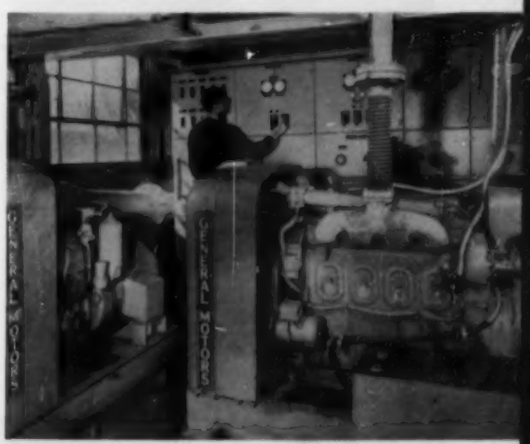
The dredge operator is located on the main deck and the dredge can be moved sideways quickly from either side of the bow by electrical and air controls on the spuds and shore lines. Adjustable speed for digging was installed because of the constant change in proportions of the deposits from heavy sand to heavy gravel encountered from top to bottom of each cut.

A fluid coupling on the main bucket drive helps cushion the shock loading through the drive and allows the drive motors to attain maximum speed quickly before transmitting the torque to the drive. It is possible to stall the bucket drive without damage since the coupling will operate at 100 per cent slip for a reasonable length of time before the oil heats to the danger point.

The loading conveyors fold back flush against the dredge to clear a 56 ft. wide lock; in operating position they reach out to the second barge on each side. A 30,000 gal. fuel tank provides for 500 hrs. of operation of the main and auxiliary diesel engines installed on the dredge.

Principal Equipment Serving *Dredge 16*

Main engines (2)	Cooper-Bessemer
Main generators	Westinghouse
Governor	Woodward
Intercoolers	Young
Starters	Ingersoll-Rand
Fuel injection pumps	Bendix Scintilla
Fuel oil filters	Purolator
Lube oil filters	CFC Fulflo
Heat exchangers	Ross
Air intake filter	Air Maze
Engine alarms	Amot
Exhaust pyrometer	Alnor
Exhaust mufflers	Maxim
Auxiliary generators sets	GM



A 20 kw and a 50 kw GM generator set supply auxiliary power for the dredge. Engines are series 71.

DIESEL FUEL PROPERTIES

A Condensation of A Paper Presented By C. S. Hansen* At A University of Illinois "Short Course For Diesel Plant Engineers". While Fundamental in Approach, It Will Be Good Reading for Men Responsible For Diesel Engine Operation

FROM the date that Dr. Diesel developed his first compression ignition engine to date, petroleum has been the preferred fuel for several reasons. The heavier fractions of crude petroleum had (1) high heat content for unit weight, (2) could be transported and stored easily with a minimum of handling equipment and expense, (3) had good combustion characteristics adapted to the diesel cycle, and (4) were available in increasing ample supply and at a reasonable cost. Crude petroleum, as we all know, is a natural resource occurring abundantly in the United States and many parts of the world. It is a mixture of many thousand types of hydrocarbon compounds, all of which have different physical properties such as weight, boiling point, combustion characteristics and heat values. Let us take a look at a barrel of crude oil (Figure 1) and see what petroleum products are refined from it. Bear in mind that the composition of crude oils vary from one field to another and that the information represents an average of refining experience in the United States in recent years. Gasoline represents the largest demand product (44 percent). The domestic heating oil, gas, oil and diesel fuel distillate "cuts" together account for about 22 per cent of the yield. Residual fuels contain the heaviest hydrocarbons in crude and account for an average yield of 15 per cent. Practically all the fuels used in diesels come from the distillate fraction, although a growing number of engines are using residual fuels. The term distillate refers to the intermediate products which are distilled from crude oil. Since each hydrocarbon compound has a boiling point distinctive from others of different structure, it is possible to separate them and this is done by distillation at the refinery. Figure 1 also shows the approximate boiling temperature range of gasoline, kerosene and distillate. Generally speaking, the heavier the hydrocarbon the higher the boiling point and the higher the heat content. Other properties, however, must be considered in selecting a fuel and these will be presented later.

When we consider diesel fuels we have to bear in mind that the design and operating characteristics of the engine influence fuel selection. Selection is further influenced by availability and cost considerations, so, many times compromises from the ideal fuel have to be made. The engine which has the ability to "digest" the broadest range of fuels with reasonable maintenance expense will make the fuel selection easiest for the operator. Engine manufacturers publish fuel specifications to guide operators. These specifications are generally related to certain physical properties for which test methods have been established by the American Society for Testing Materials in cooperation with manufacturers, refiners and users. Let's take a look at these tests and their significance noting Figure 2 which lists the usual physical properties.

Manager, Industrial Sales, Pure Oil Co.

Mr. C. S. Hansen

ASTM engine used for testing ignition quality of fuels by the cetane method.

Distillation

Fuel is distilled in laboratory apparatus to determine the temperatures at which 10% volume increments will boil. The boiling point of the first drop distilled is called Initial Boiling Point (IBP) and subsequent increments distilled will be at higher temperatures. Highest temperature reached when all of the fuel has been distilled is designated as the End Point (EP). Refinery control specifications generally state the maximum temperatures allowed for 10%, 50%, 90% and End Point. The distillation range serves to classify a fuel by grade and is an important refinery control test. Distillation test is also a measure of the balance of the light and heavy fractions in the fuel. A preponderance of heavy fractions in the fuel may result in good fuel economy but could result in excessive combustion deposits. A preponderance of light fractions will provide easy engine starting at low air temperatures and better combustion under variable speed and load conditions, but will not release as much energy per gallon as the heavier fractions. Engine design and operating conditions influence the choice of the distillation characteristics of the fuel.

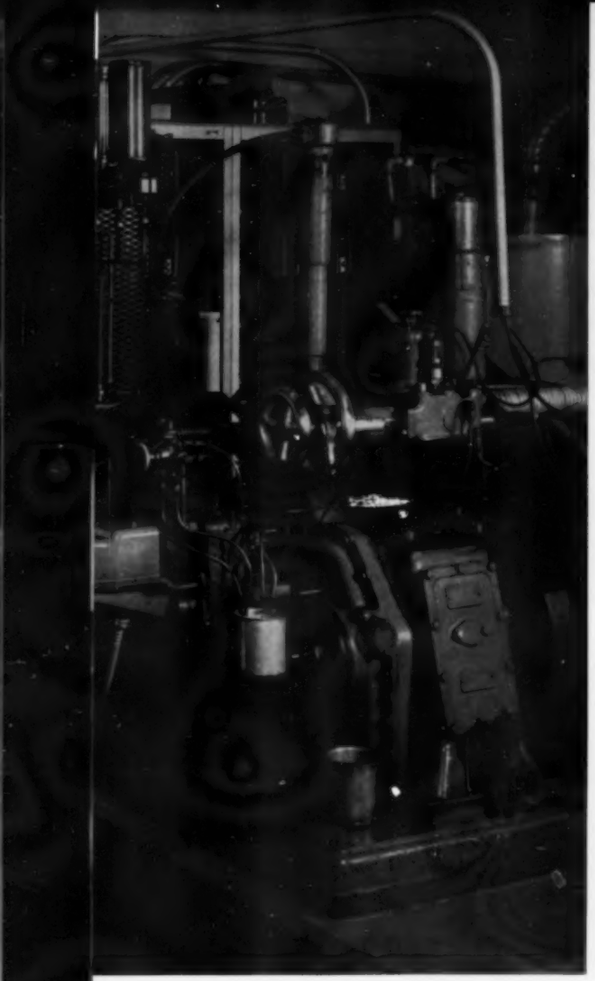
API Gravity

This is an indication of the weight/gal. of the fuel. The heavier the fuel the higher is its heat content. Water is the basic reference for the specific gravity of a substance and by definition has a specific gravity of 1. Most hydrocarbons in petroleum are lighter than water and therefore have specific gravities less than 1. Some heavy residual fractions have gravities greater than 1.

The specific gravity scale is awkward to use for petroleum so the petroleum industry has devised the American Petroleum Institute (API) scale which is based on the following formula

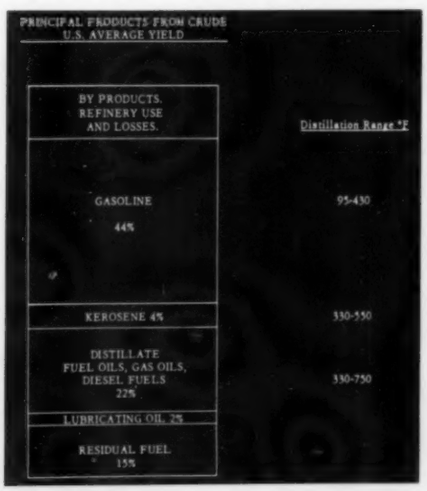
$$°\text{API Gravity at } 60°\text{F.} = \frac{141.5 - 131.5 \times \text{Sp. Gravity at } 60°\text{F.}}{\text{Sp. Gravity at } 60°\text{F.}}$$

In the above formula you will note then that water has an API gravity of 10° at 60° F. temperature, or in other words a specific gravity of 1 is equivalent to 10° API. The higher the API gravity the lighter the fuel is per gallon and diesel fuels are in the approximate range of 30-45°. API gravity is measured by using a hydrometer calibrated to the API scale. Readings are corrected to volume at 60° F. Inasmuch as petroleum expands and con-



tracts depending on the temperature, most petroleum products are sold at wholesale on volume corrected to a standard temperature of 60° F. It is necessary to know the gravity of fuels in order to correct the volumes delivered to standard volume at 60° F. for billing purposes. There are standard tables available for this purpose. Gravity sometimes appears in diesel fuel procurement specifications as a minimum or a maximum, or as a range. The nature of the crude oil, the desired distillation range and ignition value determines the basic make up of the fuel at any refinery and

Figure 1



the gravity is measured for the products produced to meet the basic requirements.

The lower the API gravity the higher the heat value per gallon. Heating value of fuels may be calculated from API gravity determinations. Although not as exact as actual values determined by bomb calorimeter methods, they are close enough for comparative purposes. A formula generally used is as follows: BTU heat value/lb. = 18650+40 (API gravity − 10)

For a distillate fuel having 32°API gravity the BTU/lb. would be 19530. From the API gravity formula previously given we calculate the specific gravity of this fuel to be .8641, which results in a weight/gal. of 7.21 lbs. (water = 8.33 lbs. per gal.). Multiplying the Btu per lb. by the weight/gal. gives a heat value of 140,811 Btu/gal. for a 32° API gravity fuel. It should be borne in mind that diesel fuel should not be selected on the basis of heat value alone because other properties are very important from the standpoint of proper functioning of the engine. However we can generalize to the extent that for equal distillation range, ignition value and impurities such as sulfur, that the lower gravity fuel would deliver more power per gallon.

Cetane Number

This is a test to determine the ignition characteristics of the fuel. It is a measure of the delay occurring between the start of fuel injection into the cylinder and the start of burning. The test is made by burning the fuel in an ASTM single cylinder variable compression diesel engine especially equipped for this purpose. Ignition delay characteristic of the fuel being tested is compared with reference fuels of defined value burned in the same engine. These reference fuels consist of blends of two pure hydrocarbons. One is cetane which has a very short delay period (high ignition quality) and which has been assigned a number of 100. The other hydrocarbon is alphamethylnapthalene which has a long delay period (low ignition quality) and which has been assigned a number of zero (0). The cetane number of the fuel being tested is equal to the percent of cetane in the reference fuel blend which gives the same ignition characteristics as the test fuel. For example: if a fuel gives the same ignition characteristics in the engine as a blend of 40 percent cetane and 60 percent alphamethylnapthalene, then the fuel is said to have a 40 cetane number.

The cetane number of a fuel is determined primarily by its hydrocarbon composition. In general the Paraffin structures have high cetane, the Naphthenic are intermediate and the Aromatic are lowest. Diesel fuels can be blended to a cetane number specification if the refiner has ample distillation and segregation storage facilities for narrow cuts. But this situation is unusual because of the cost.

Much test work has been done to evaluate the importance of cetane number in diesel fuel performance. This property is of most significance in starting cold engines and in getting smooth operation without roughness during warm-up and operation. Good ignition quality (high cetane) is important in the high speed diesel engines, particularly those which are operating under changing load and speed conditions. Lower cetane numbers are satisfactory in the low speed, constant load, large industrial engines such as are used in power generating plants. Cetane numbers can be too high resulting in incomplete combustion and smoke. This is brought about by insufficient delay to permit proper mixing of fuel and air prior to ignition. The cetane number of diesel fuels being marketed are entirely adequate for the types of engines being operated in the United States. The so called high speed fuels in the No. 1 distillation range (kerosene type) have an average cetane in excess of 50. Heavy distillate fuels are about 45 C.N. average.

Viscosity

This property defines the resistance to flow and is usually expressed in terms of Saybolt Universal seconds at 100° F. The heavier the fuel, the higher its viscosity. The viscosity is entirely dependent upon the composition of the fuel and cannot be controlled independently of the distillation range. Viscosity or "body" is recognized as having an influence on leakage and wear of injection equipment and lower limits are generally put into fuel specifications for this reason.

Pour Point

This is the temperature at which the fuel will barely flow. Pour point is important only in handling fuel in cold weather and here again is dependent upon the hydrocarbon composition. The paraffinic hydrocarbons have higher pour points. Paraffinic hydrocarbons also have higher cetane numbers, so reduction in pour point will have to be made at the expense of ignition quality for the same distillation range.

Sulfur

Diesel fuels contain varying amounts of sulfur depending upon the crude oil source, refining process and grade. Sulfur tends to be more prevalent in the higher boiling fractions. High sulfur content can become a problem in diesel engine operation at low temperatures and with intermittent operation. Under these conditions, where

Figure 2

DIESEL FUEL PROPERTIES

DETERMINED BY ASTM TEST METHOD:	
Distillation	D86; D158
API Gravity	D287
Cetane Number	D613
Viscosity	D445; D446
Pour Point	D97
Sulfur	D129
Carbon Residue	D524
Water & Sediment	D96
Ash	D482
Corrosion	D130
Flash Point	D93

Research scientists maintain a constant search for methods to improve fuels.

more moisture condensation can take place, cold corrosion and increased cylinder wear may accompany the use of fuels containing more than 1 per cent by weight of sulfur. This problem is much less apparent in constant speed and load engines operated with good temperature control. Heavy duty type lubricating oils will materially counteract fuel sulfur effects and enables the operator to use locally available fuels with a higher sulfur content.

Carbon Residue

This test is made on distillate type fuels by taking the final 10% of a distillation sample (the heavy ends) and "coking" it at a temperature of 1020° F. The percent by weight of carbonaceous material and ash is indicative of the amount of residual or contaminating material in the fuel. Limits are set, usually 0.35%, for heavy distillates. The tendency of a fuel to form carbon deposits is indicated by this test, but comparisons have to be made between fuels for the same engine and due consideration given to other more important characteristics of the fuels being compared. There are other minor tests appearing in fuel specifications which have to do with limiting the water and solids content and corrosive effect on non-ferrous metal in fuel handling systems. These have no effect on fuel performance. Flash point temperatures are usually specified to conform with legal requirements in effect.

Diesel Fuel Specifications

As mentioned earlier, engine manufacturers publish specifications to serve as a guide in procurement. Some such specifications are quite detailed while others for example, state that any good domestic burner oil is adequate. Some engine builders refer to the American Society for Testing Material Classification D975, which gives requirements for diesel fuel oils. This classification was devised by joint agreement between engine builders, refiners and engine operators. ASTM D975 covers three grades of fuel oils suitable for various types of diesels. Figure 3 gives the specifications of the classification for ready reference.

Many large slow speed diesel engines are built to use residual fuel oils, the main advantage of which is the higher heat value and the lower price per gal. Substantial savings can be made with a carefully engineered installation which will pay out the added original cost and more than cover some increase in maintenance expense which might be encountered.

Figure 3

CLASSIFICATION OF DIESEL FUEL OIL

ASTM DESIGNATION D975-55T

GRADE NUMBER	1-D	2-D	4-D
Engine Service	Frequent Speed & Load Change	Industrial & heavy mobile	Low and medium speed
Distillation °F End Point, Max	625	–	–
90% Pt. Max	–	675	–
Cetane No. Minimum	40	40	30
Viscosity @ 100 °F Outt.stokes	1.4 Min.	1.8–5.8	5.8–26.4
Saybolt Sec.	–	32–45	45–125
Sulfur % Max.	0.5	1.0	2.0
Carbon Residue, 10% Residue % Max.	0.15	0.35	–
Water & Sediment, % Max.	Trace	0.10	0.50
Ash, Wt. %	0.01	0.02	0.10
Corrosion, Max.	No. 3	No. 3	–
Flash Point, °F. Min.	100 or Legal	125 or Legal	130 or Legal

ELECTRONICS PREDICT PERFORMANCE

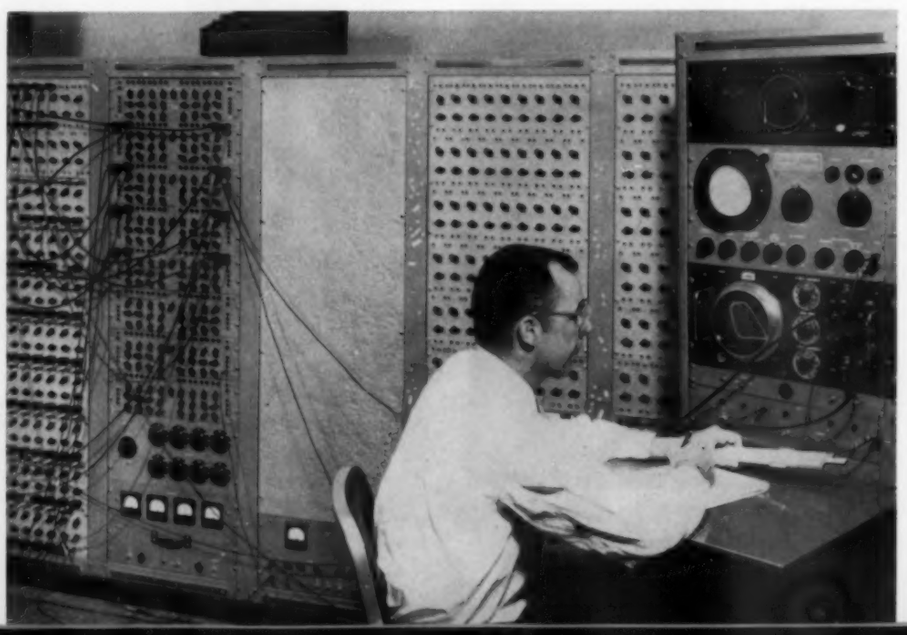
AN electronic machine said to greatly reduce costly piping alterations at compressor stations along new natural gas pipe lines is being used at Worthington Corp.'s new research laboratories at the firm's compressor and engine plant in Buffalo, N.Y. Called an electrical analog, the Worthington machine is reported as the newest and most advanced of three analogs for this purpose in existence. With it, Worthington engineers can create electrical circuit analogies which accurately predict machine and system performance.

Engineers can spot in advance vibration patterns that cut efficiency and cause maintenance problems. At the compressor stations multiple compressors repressurize natural gas being piped to market areas and discharge it back into the main line pipe. Pulsations cause the vibration and wear. To prevent harmful vibrations and pulsations, each stroke of the compressor and the length of each piece of pipe must be carefully coordinated. Coordination is the job of the analog. Electrical resistors and capacitators take the place of each piece of pipe in the blueprints. Engine speed and the exact relationship of each component from one moment to the next must also be electrically accounted for in the analog. Once the machine is set and turned on, vibration patterns in the proposed piping produce a wave shape on a panoramic analyzer. Problems can be seen in advance and changes in the plans can be made before costly construction work begins.

"The analog means faster development," said Jack Hoefner, research manager at Worthington's new labs. "We have also added new features to our analog. On it we can duplicate the exhaust or air intake piping of the big compressor engines. This makes it possible to study other fields such as overall engine turbocharger efficiency."

Southwest Research of San Antonio, Tex. built the first analog in 1955. The natural gas industry and heavy equipment manufacturers contributed to the development. The analog was then made available for use by the participating firms. However, there is usually a big backlog of projects awaiting the Southwest Research analog. Plans for the analog were also available to member firms and Worthington decided to build its own improved analog.

Electrical analog creates electrical circuit which accurately predict machine and system performance before design and construction are finalized.



DAIMLER-BENZ TAKES OVER MERCEDES DIESEL PROGRAM

Industrial Division in Flushing, L. I., N.Y. Is Headquarters for New Import, Sales and Service Organization for United States and Canada

ESTABLISHMENT of a new import and distribution program for Mercedes-Benz diesels in the United States and Canada is announced by Daimler-Benz of North America, Inc., a wholly owned subsidiary of Daimler-Benz A.G. Stuttgart, Germany. The franchise for this program had been in the hands of the Utica Division of Curtiss-Wright Corp. The agreement was terminated in November, 1959 when it appeared to be in the mutual interest of both companies.

Full responsibility for the Mercedes-Benz program, according to H. C. Hoppe, vice-president of Daimler-Benz N.A., will be that of the company's Industrial Division with headquarters at 126-56 Northern Blvd., Flushing, Long Island, N.Y. "We have taken over the distribution organization which Curtiss-Wright set up for our engines", Hoppe stated, "and we intend to assist this organization to the fullest degree. In line with this we have employed a number of experienced and trained personnel in our Industrial Division."

Appointed in mid-February to the position of general manager of the Industrial Division is Alfred H. Carroll, formerly product distribution specialist in General Motors Overseas Operation. Joining Carroll as general sales manager is Edward R. Paterson, also from GM's Overseas Operation. In an interview with Carroll, he mapped out a two-year program of sales planning and development of distribution and service facilities. The Flushing facility has become the technical and service center and will coordinate all distributor and U. S. regional office activities as well as those of the Toronto branch. Flushing will also be the engineering center for equipment application, testing, special product building and service, and will be the central depot for parts. To expedite service on the latter, an extensive control system is now being established. In addition to the three offices in Canada, sales representatives will be located in various sections of the U. S. Mr. Hugo Buechelmaier is the new Eastern representative. His headquarters will be at Flushing.

Mercedes-Benz diesels are available to 3000 hp; however according to Carroll, immediate attention will be focused on the engines in the 20 to 300 hp range and their application in highway reefer service, contractors equipment, oil field service, generator sets, marine propulsion, etc. The overall engine line consists of in-line, Vee and horizontal configurations that have been designed for lightweight and compactness. Engines are available from two to 12 cylinders and all are designed with a pre-combustion chamber system. One of the well known Mercedes engines with a wide range of application is the OM 636 which recently has found extensive application in highway reefer service. (See DIESEL AND GAS ENGINE PROGRESS, Sept. 1959 issue).

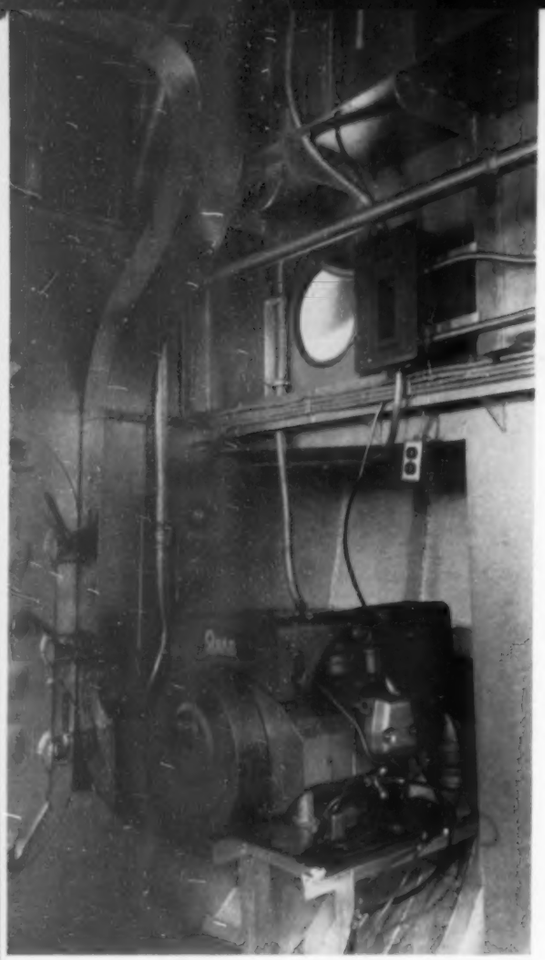
Alfred H. Carroll

Edward R. Paterson

Mr. Carroll, a native-born New Yorker, brings to Daimler-Benz a background well suited to his new position. Following his tour of duty as a naval line officer during the war years, he traveled extensively in Australia and while there received his engineering degree. Returning to the U. S. in 1953, Carroll joined GM's Cleveland Diesel Engine Division as senior project engineer. Three years later he was promoted and transferred to GM's Overseas Operation as product distribution specialist. In this position he traveled extensively and was responsible for the origination, training and implementation of market distribution programs for GM diesel engines.

Also a native New Yorker, Paterson has been identified with diesel engine sales and application engineering throughout his business career. He became associated with a firm of naval architects and engineers in 1928 and later was trial engineer for a large ship yard. From 1944 to 1949 he was chief supervisory engineer of diesel ferry operations with the Armed Services. Following this Paterson aligned with the GM dealer organization handling diesel sales and application engineering. Since 1956 he has served with the Power and Industrial Section of GM Overseas Operations handling sales of engines and parts to concerns buying power units, generator sets, etc. in this country for use abroad.

Flushing, L. I. headquarters of Daimler-Benz of North America's Industrial Division. Facility is center of new import and distribution program.



ENGINE COOLING AIR HEATS CABIN, MELTS ICE ON PANES

UP at Sault Ste. Marie, Mich., where dredging work is being done on the channels of the St. Mary's River, hot air from a diesel generator set not only heats the cabin of a construction firm's tugboat but keeps the boat's pilothouse windows frost-free as well!

The Aljohn-Kiewi Co., installed a 6 kw set on the tugboat *Leslie Ann* to provide dependable electric power for lighting and to operate fuel transfer pumps. The *Leslie Ann* carries 1800 gals. of diesel oil and refuels some half-dozen dredges as they work around the clock. The generator set is an Onan model 6DRN equipped with Vacu-Flo cooling system which pulls air through the generator and over the engine by means of a centrifugal blower. Extended ductwork was put in to lead hot air to a floor register in the wheelhouse and also to the observation windows. "Now," says Supt. Art Engnes, "we use the hot air in the blower for warmth and at the same time direct it through the ducts to get rid of heavy ice."

The Onan diesel engine is an air cooled, 2 cylinder, four cycle unit rated 14 hp at 1800 rpm. A square engine with bore and stroke of 3½ in., it has a compression ratio of 17.5:1. The Onan generator is directly connected to the engine by a semi-flexible drive disc. Engnes said the 6 kw unit saves his firm over $2500 a year in fuel costs compared with a comparable gasoline engine driven generator.

Vacu-Flo cooling system on this Onan Model 6DRN generating set permits hot engine air to be exhausted through ducts to heat wheelbase, melt ice on tug's windows.

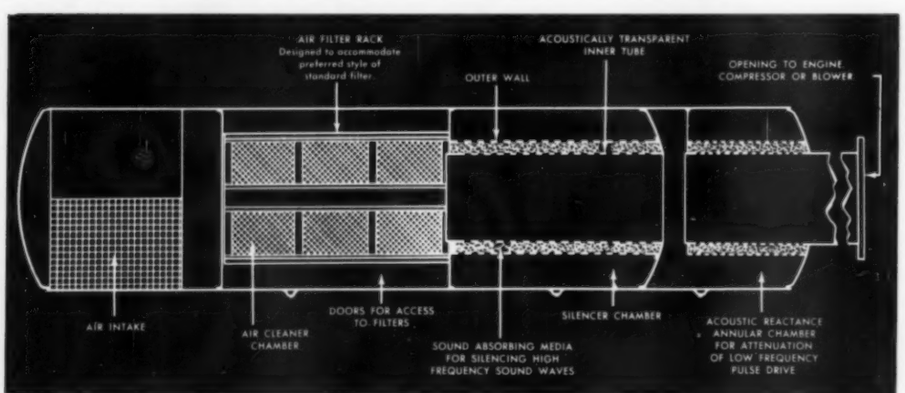
The *Leslie Ann* in drydock. Warm air from diesel generating set keeps windshields clear in cold weather.

AIR INTAKE CLEANER SILENCERS

AN air filtering system designed to serve alone or as part of an air intake silencer has been designed by the Burgess-Manning Co., Industrial Silencer Division. The air intake cleaner silencer can be engineered to suit individual requirements to reduce intake noise level and assure a supply of clean filtered air.

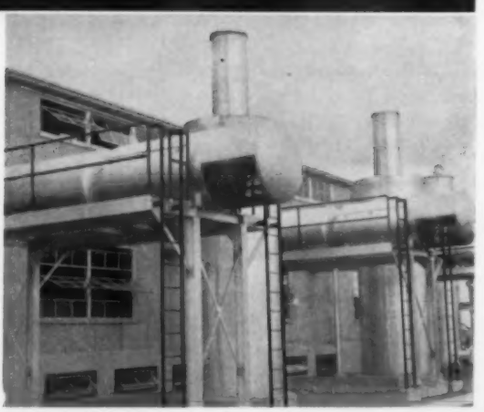
The Burgess-Manning air cleaner is a separate chamber of the silencer unit that can be a part of the silencer structure or a separate unit attached to it. The filter rack in the cleaner chamber is designed to support a number of filter elements which can be of any preferred standard make or style. The filter rack encloses the passage to the silencer unit so all air must pass through the filters. Doors in the outer shell provide access for cleaning or element replacement.

The intake silencer is of the "straight-through" absorption type. Air flow is channeled through a tubular, unobstructed passage formed by an acoustically transparent cylinder surrounded by a media that absorbs the high frequency sound waves. The low frequency pulse drive is attenuated by an acoustic reactance chamber that surrounds the inner cylinder. Air flow is thus subjected to a minimum restriction. The basic design can be modified to suit the capacity, service and physical requirements of a specific installation.


AIR FILTER RACK
Designed to accommodate preferred style of standard filter.
ACOUSTICALLY TRANSPARENT INNER TUBE
OUTER WALL
OPENING TO ENGINE COMPRESSOR OR BLOWER
AIR INTAKE
AIR CLEANER CHAMBER
DOORS FOR ACCESS TO FILTERS
SOUND ABSORBING MEDIA FOR SILENCING HIGH FREQUENCY SOUND WAVES
SILENCER CHAMBER
ACOUSTIC REACTANCE ANNULAR CHAMBER FOR ATTENUATION OF LOW FREQUENCY PULSE DRIVE

Cross section of a typical, horizontal Burgess-Manning air intake cleaner silencer. Air cleaner can be integral or a separate unit attached and connected to the silencer structure.

Air intake cleaner silencer installed on a series of gas engine driven compressors. Access doors on bottom of the intake section facilitate cleaning and filter element replacement. Air intake is screened and located to receive maximum protection from the weather.



ANNOUNCE NEW WHEEL LOADER LINE

MAJOR features of the Cat No. 944 Traxcavator, first of a new line of wheel loaders produced by Caterpillar Tractor Co., have been announced. Most apparent feature of the new machine is location of lift arms and hydraulic cylinders ahead of the driver's compartment.

The No. 944 is fitted with a two cu. yd. capacity bucket as standard equipment. Maximum rating of the D330 diesel engine used in the No. 944 is 135 hp, with a 105 hp net rating. High productive potential of the new unit results from a combination of power shift transmission which permits split-second shifting into forward or reverse gear, a new design, high capacity hydraulic system that delivers full hydraulic power during critical loading phases; and a high degree of machine stability in all operating conditions.

Dumping reach of the No. 944 Traxcavator is 31.75 in. at maximum height. Maximum dumping height is 9 ft. 1.87 in. Front tires are the farthest forward portion of the machine frame, lessening the risk of damage to truck bodies by contact while loading. The bucket is provided with a tip-back angle of 41 degrees at ground level. Tip-back at maximum lift is 50 degrees. Automatic bucket positioner and lift kickout, operated hydraulically, are standard equipment.

Dumping reach and machine balance are features of the Cat No. 944 wheel Traxcavator. Here, a test machine holds a load at full lift height of 12 ft., while moving to dump into a transporting vehicle. Vehicle is powered by a Cat D330 diesel engine rated 135 max. hp. Unit has a Twin Disc type 6, 1300 series single stage torque converter.

The power train of the No. 944 Traxcavator includes torque convertor and a power shift transmission, a two-speed forward, two speed reverse, planetary transmission. It consists of four in-line gear trains, each with a separate clutch. Two of the planetary trains provide direction control, while the other two provide gear speed selection. In addition to the power shift transmission, the power train includes a manually shifted range selector transmission, which provides the machine with a four-wheel-drive work range or a two-wheel-drive travel range. The transmission is geared to provide 25 per cent faster travel speed in reverse.

The transmission is controlled by a direct-acting hydraulic control system. Incorporated in the system is a pressure-modulating relief valve which assures smooth shifting by applying gradually increasing pressure to the clutch plates. A hydraulic safety valve in the transmission control unit automatically shifts the transmission into neutral should oil pressure drop or the tractor be shut down.

Bucket capacity of 2 cu. yds. and matched power train components characterize the new Cat No. 944 wheel Traxcavator. Machine weight is approximately 20,000 lbs.

Machine direction is controlled with two control levers, a forward-reverse lever and a speed-selector lever. Two air-boosted brake pedals are suspended from the compartment wall. The left brake contains a neutralizer valve, which shifts the directional control into neutral automatically when 40 psi brake pressure is applied.

The hydraulic system is entirely enclosed. The loader hydraulic arrangement is built on a modified series circuit. During the loading cycle, when both lift and tilt circuits are used simultaneously, the design gives priority to the tilt control, allowing most efficient interaction of the controls for bucket loading.

Loader lift arms are made of solid two-inch plate. The bucket is of welded construction and is equipped with self-sharpening cutting edge. A line of attachments was made available with introduction of the No. 944.

Scheduled for availability later in Spring were the No. 922 and No. 966 wheel Traxcavators, with configuration and design features similar to the No. 944. The No. 922 is available with new Caterpillar four cylinder turbocharged diesel engine of compact design. Standard bucket is 1.25 cu. yd., maximum lift is 134 in. and bucket reach at seven feet is 38 in. The 966 is powered by a six-cylinder turbocharged diesel engine, also a new design. It has a 2.75 cu. yd. bucket, maximum lift of 154¼ in. and 37.75 in. reach at seven ft.

FIRM DRIVES PILES FASTER WITH DIESEL HAMMER

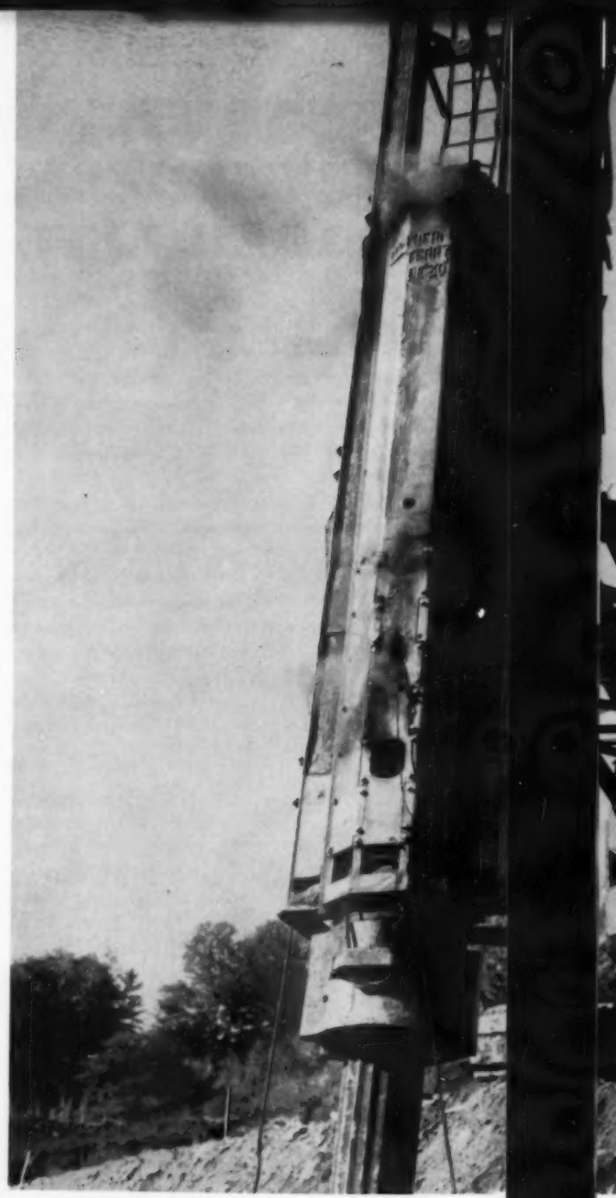
New Designs Produce Lightweight, Mobile Hammers Especially Suited to Hard-Boiled Pile Driving Requirements While Speeding Work and Cutting Fuel Costs

By DWIGHT P. ROBISON

AS part of the program to expand Florida's network of freeways, some 50 bridges are being built in and around Miami. Columns for most of the bridges are being formed by 50 ft. long, 10½ ton prestressed concrete piles which are being driven 30 to 35 ft. into formations of coral rock and sand. A total of 60,000 ft. of the 18 in. square piles are being driven by the contractor, F & C Contractors of Miami. For the job, F & C is using diesel pile hammers and the economy and efficiency with which the hammers are doing the job is proof again of the effectiveness of the diesel. Average driving time for each pile is 20-25 minutes.

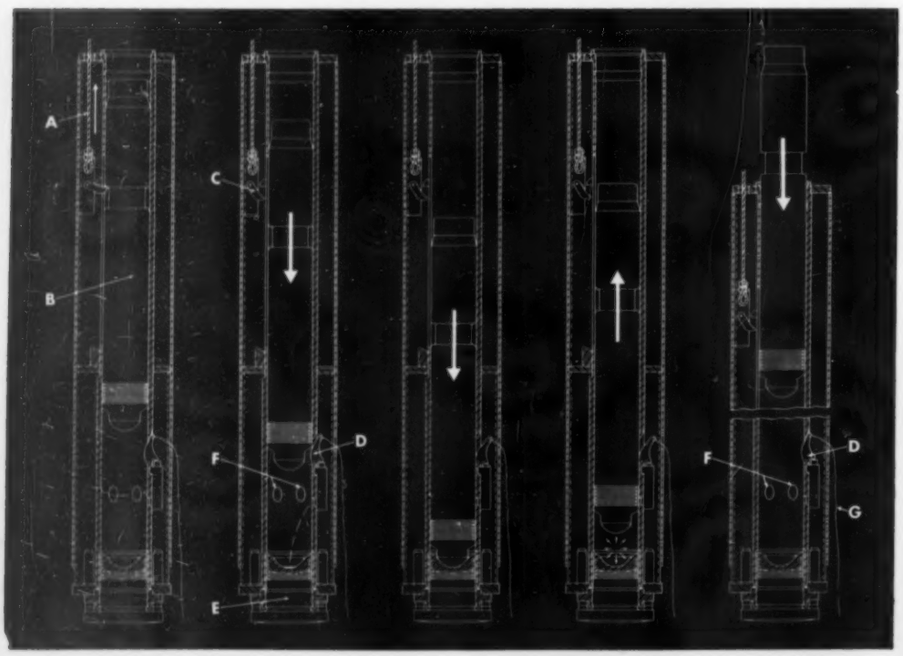
A look at the history of diesel hammers finds that many contractors, in the past, have regarded them with mixed feelings. In view of the economy, driving effectiveness, and mobility of the diesel, this may seem strange. However, early diesel hammers used in the United States were designed specifically for European construction where driving schedules were not heavy, jobs infrequent, and the cost of continual maintenance negligible because of the abundance of cheap labor. Therefore, when thrown into hard, continuous use on the American continent, where maintenance used to be treated as a necessary evil instead of a religion, the diesel hammer of the 1930's consistently shook itself apart. As a consequence, the American contractor reasoned that he could not afford to baby the diesel along if he were to take full advantage of the hammer's basic speed and mobility.

Early European-designed diesels thus fell into disrepute in the United States but the idea of a light weight, self-contained, completely mobile diesel pile hammer . . . free of the encumberances of supply hoses and boilers, and adapted to use in remote, swampy environment . . . continued to kindle the imagination of domestic manufacturers. In the late 1940's, The McKiernan-Terry Corp. of Dover, N.J., along with other manufacturers, recognized the potential market for a highly mobile hammer in the U. S. and set forth independently to design, develop, and market diesel hammers especially suited to hard-boiled American pile driving techniques. The European design was used as a starting point, and its modifications in accordance with common-sense job requirements resulted in hammers such as the ones we have today.



McKiernan-Terry DE-30 driving 12 in. x 35 ft. monotube pile during construction of the New York Thruway. Contractor is the Binghamton Bridge Construction Co.

Operating cycles of diesel pile hammer. Refer to text for detailed explanation.



Close inspection of today's diesels bring out many useful features and advantages over steam hammers. Aside from being mobile and durable, diesels are less costly to operate. Fuel consumption of diesel hammers is usually about three gph while the compressors needed to operate steam hammers burn four to six times as much to do the same driving job. The real economy of the diesel shows up when we combine this saving with the fact that diesels eliminate the need for a compressor which usually costs about $18,000.

Its simple operation is an outstanding feature of diesel hammer. Shown on this page are drawings of one of the McKiernan-Terry DE series Hammers. This hammer is worked by a single, crane, load-line (A). It is started merely by lifting the ram-piston (B) with the load-line until the trip mechanism (C) automatically releases the ram-piston, which in falling actuates the cam of the fuel pump (D) that delivers a measured amount of liquid fuel into a cup formed in the top of the

anvil (E). Continuing in its downward gravity fall, the light-ringed ram-piston blocks the exhaust ports (F) and begins compression of the air trapped between the ram-piston and the anvil. Compression of the trapped air creates a preloading force upon the anvil, drive cap, and the pile. The gravity-propelled ram-piston strikes the anvil, delivering its impact energy to the pile.

The ball pointed ram-piston mates perfectly with the cup in the anvil, displacing the liquid fuel at the precise moment of impact to achieve perfect timing. The fuel is splattered into the annular zone around the ram point and the anvil. Upon entering the high-pressure hot air, it ignites. The resultant explosive force drives the ram-piston upward and the pile downward, adding a push to

McKiernan-Terry DE-40 diesel pile hammer driving 24 in. square x 50 ft. long concrete piles through coral rock and sand in Miami, Florida. Contractor is F. & C. Construction Co.

DE-40 driving 18 in. square x 50 ft. long concrete pile.

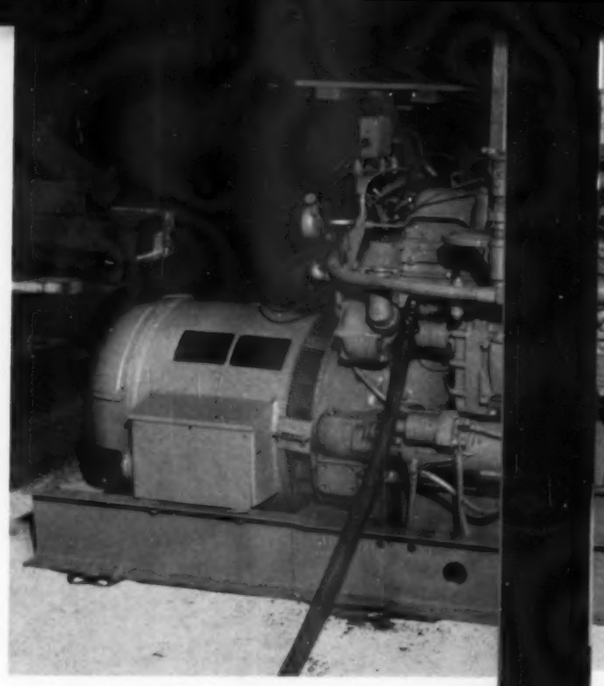
the pile to extend the time duration of the total effort to move the pile. This extended-time-duration blow allows piles to be driven much harder without damage.

On the upstroke, the ram-piston opens the exhaust ports (F) to permite scavenging the exhaust gases. The ram-piston continues freely upward until arrested by gravity. The length of the stroke varies with the resistance offered by the pile. Having reached the top of its stroke, the ram-piston falls again, repeating the cycle. The hammer is stopped by pulling a rope (G), disengaging the fuel pump cam (D). The hammer can deliver an average of 50 strokes a minute.

The fuel used in the pile hammer is usually No. 1 or No. 2 diesel oil, depending on which is being used in the crane. The cylinder is lubricated with 30 or 40 weight high detergent cylinder oil. Diesel pile hammers are rated at an applied energy per blow in foot pounds equal to the weight of the ram-piston times the length of the stroke. McKiernan-Terry fits their hammers with a permanent, graduated scale to permit measurement. Inspectors can observe the actual stroke or assure a minimum stroke and translate the stroke to static load bearing through the use of the same formulae or load bearing charts used for other pile hammers. The DE-20 hammer rating ranges from 8,000 to 16,000 ft. lbs., depending on stroke length while the DE-30 range is from 11,200 to 22,400 ft. lbs.

SPARK IGNITED CONVERSION OF GM SERIES 71 ENGINES

By BRUCE W. WADMAN



HOUSTON, Texas—March 8, 1960—Today, at the plant of Stewart & Stevenson Services, Inc., I was shown the well known GM 6-71 diesel adapted for spark ignition natural gas operation. Mr. Joe Manning, vice president and general manager of the Houston firm, and I went back into the shop and watched one of the engines on test in a generator set application. It was operating under extreme variations in load and the smoothness of performance on natural gas was very impressive. The engine also exhibited fine pickup characteristics with the fluctuating load. Mr. Manning explained the modifications necessary to convert the 6-71 diesel to natural gas, the details of performance and the tests that have been run. These remarks tell the story so well that the following is Joe Manning's direct quotation on this important development:

"Here are the details and the answers to your questions regarding the development work which our firm has been engaged in for the conversion of the model 71 series GM engine for spark ignition service. We have recognized for many years the need for a truly versatile diesel engine. By versatile, we mean an efficient diesel engine that could be quickly converted for full natural gas operation as a spark ignited unit. For the past two years, we have been experimenting with the Series 71 engine and progressing along these lines."

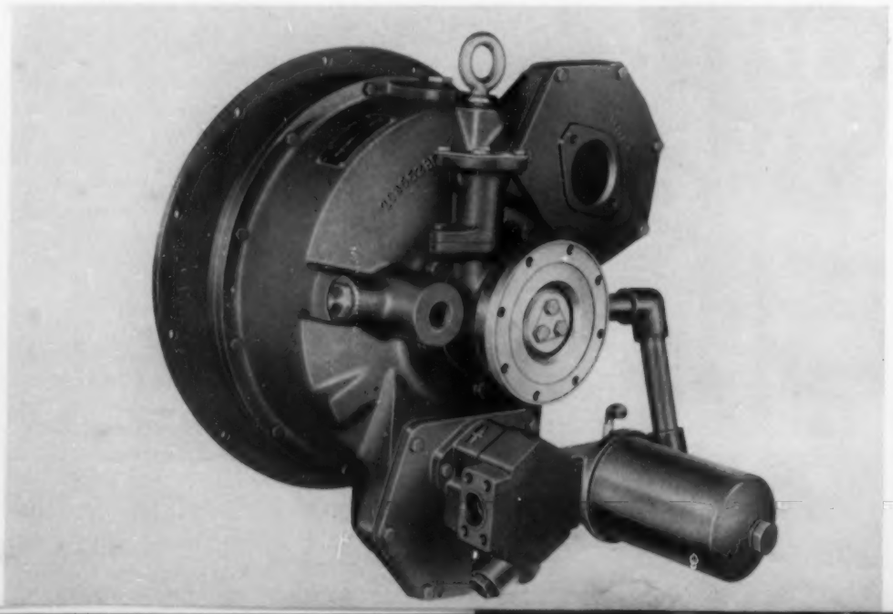
"What you saw here was the result of about two years of testing and many thousand hours of actual operation after extensive research. The unit you saw operating in our plant was a standard model 6-71 GM Detroit Diesel engine direct connected to an alternating current generator operating at 1800 rpm. This particular unit was being operated on 100 percent natural gas and producing the power required to operate a 75 hp electric motor driven air compressor which serves a part of our factory compressed air requirements. This particular engine has been operating on this application without any attention or changes every working day for the past 30 days. There have been no adjustments to the carburetor or the ignition system in any manner. The unit is started at approximately 7 a.m. and shut down at approximately 5:30 p.m."

"We also point out to you the fact that the engine generator unit was carrying the load which was varying about every 60 seconds; the characteristics of the load being no load for about 60 seconds and then full load for about 60 seconds. This represents about as tough a test as we feel could be imposed on this particular application. The response which you noted from no load to full load on this unit was as good or better than anything we have ever produced with an engine when operating as a straight diesel. For example this particular unit which was equipped with a standard model SG Woodward hydraulic governor was varying only one cycle in speed from no load to full load and vice versa."

"Although we are not completely ready to offer the conversion kits for spark ignited operation on natural gas with the 71 series engine, we are pleased to have had an opportunity for you to witness the results of our various tests and efforts and we feel that we have a very unusual kit and in a very short time the kits will be available for the series 71 engines. Conversion of the full diesel compression ignition engine over to spark ignition natural gas burning engine is of course not new; however, our modification is new. For instance, the Stewart & Stevenson conversion kit

NEW TORQUE CONVERTERS HAVE SUMPLESS DESIGN

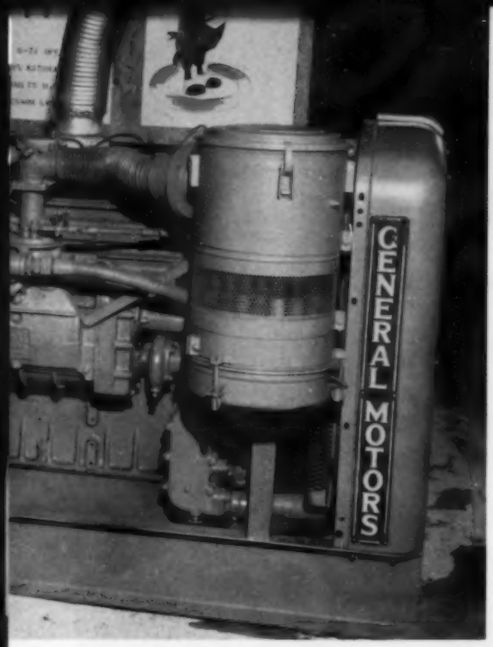
Twin Disc Single Stage Units For Power-Shift Transmissions



FOR motor graders, front end loaders, tractors and other vehicles with power-shift transmissions, Twin Disc has developed a new line of sumpless torque converters. These are single-stage units furnished in three different input torque capacity sizes: 350 lb.-ft. (1300 series); 450 lb.-ft. (1500 series standard-duty); and 650 lb.-ft. (1500 series heavy duty). Both the 1300 and 1500 series units have a power take-off point normally used as a power implement pump drive. A second PTO point is furnished on the 1300 series only. This is a lower capacity drive that can be used for a steering pump on various types of vehicles requiring power steering.

The plumbing on the sumpless torque converter must be integrated into the transmission system, or an independently mounted sump supplied by the equipment manufacturer. Standard on all converters is a circulating pump which directs oil through a cooler. An optional duplex pump is available on the 1500 series units. One side of

Twin Disc single-stage torque converter with power take-off drive. Unit is rated for engines developing 350 to 650 lb.-ft. output torque.



Converted GM 6-71 spark ignition on test produced 143 bhp at 1800 rpm. Unit drives Delco generator and is equipped with Ensign carburetor, Woodward governor, and Donaldson air filter.

with all modifications does not require any machining or change of the compression of the series 71 GM engine. We use the standard cylinder head, same pistons and liners, consequently the same compression ratio. There are no internal modifications made to the engine in any way. To convert the standard series 71 Diesel engine for operation on natural gas, it is necessary only to remove the injector assembly and insert an adaptor on which the patent has been applied for. This adaptor is installed in the cylinder head in the same location and held in place in the same manner as the injector. Inside the adaptor a 14 mm spark plug is inserted. The next item to be added is either a distributor or a magneto which is driven off of the camshaft drive at the rear of the engine through a coupling. Ignition wiring is then connected between the distributor or magneto and the spark plugs. An ignition switch is installed on the instrument panel."

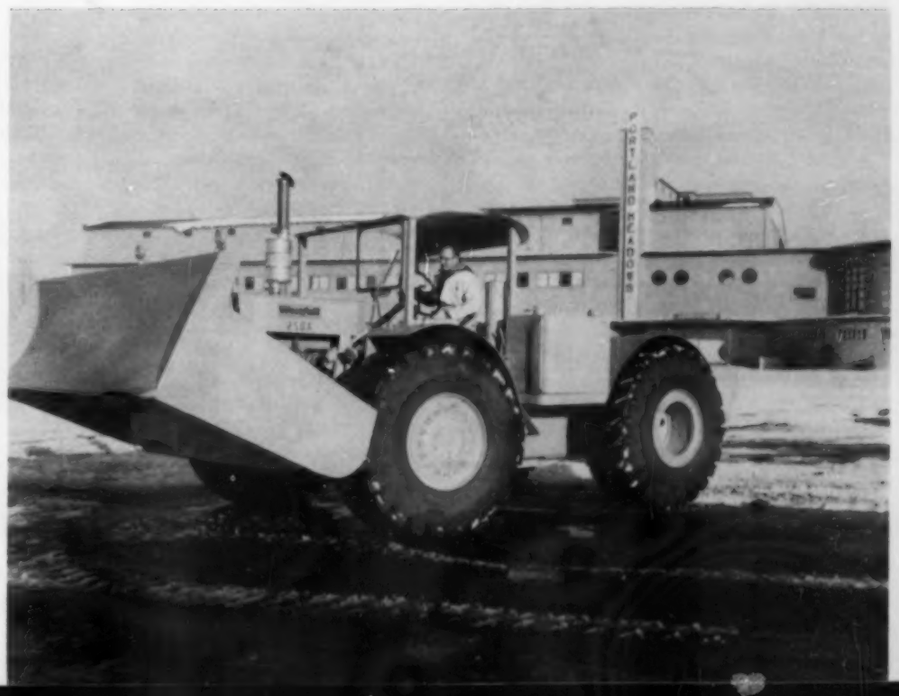
"The next requirements are the addition of a standard Ensign natural gas carburetor which is mounted with the adaptor directly onto the intake housing of the engine blower. This carburetor of course is equipped with the usual regulators for natural gas operation. Linkage from the governor on the engine is changed from the original diesel linkage and simple attachment on the linkage controls are installed between the governor and the carburetor for control of engine speed and throttling. The next item of modification is the installation of a unique valve arrangement on which patent has been applied for, which connects the blower intake flow of the carburetor to the engine air box. Control of this valve is through linkage between the carburetor and the valve. This arrangement is such that when the engine load in reduced, and the carburetor opening partially closed by the carburetor butterfly, then simultaneously the valve in the blower intake is opened. This permits a balance or compensating action between the air box and blower intake flow to the carburetor which eliminates any blower seal problems, extra blower loading and at the same time lowers the fuel consumption. These simple modifications complete the change over necessary for operation on straight natural gas."

"The total time required to make these changes in the field with ordinary hand tools is approximately 1½ to 3 hrs. So simple is the change-over from full diesel operation to natural gas and back from natural gas to full diesel, that it is unnecessary for the user of one of these engines to have to consider operating his engine on butane or other LPG fuel that would require reduction of the compression ratio. In other words, a user operating his engine as a spark ignited unit on natural gas in a natural gas field can change over from his spark ignited system back to diesel in such a short time (approximately 1 to 1½ hrs.) that it would not be necessary to burn higher priced LPG fuels. Also, since this spark ignited conversion for the GM engine does not require lowering of the compression ratio, the operating efficiency is high."

"Sufficient testing has been done to indicate in actual field operation, that the wear characteristics are exceedingly good on the conversion. For example, one unit was operated more than 1½ years logging over 8000 operating hrs. without ever changing the lube oil in the crankcase. No maintenance of any kind was required other than ignition points and spark plugs with the average spark plug life on that particular early test on the engine being in excess of 500 hrs. Based on the results of our latest test and improvements incorporated in the test engine which you witnessed in our plant, we expect spark plug life in excess of 1500 hrs. It is also interesting to note that the spark ignition conversion for the GM Diesel engine does not reduce the continuous hp rating as set out by the original manufacturer. For example, the model 6-71 engine performance at various rpm under test resulted in the following:

1200 RPM—105 BHP
1300 RPM—112 BHP
1400 RPM—118 BHP
1500 RPM—125 BHP
1600 RPM—130 BHP
1800 RPM—143 BHP

this pump acts as the cooler circulator while the other side provides a pressure head for actuating oil clutches, cooling clutch plates and lubricating bearings in the power-shift transmission. Both pumps are available in two capacity sizes depending on cooling requirements. Wet or dry flywheel construction is optional with the 1500 series. The 1300 series is furnished in an open-end dry flywheel construction only. Model 250A, a pneumatic tire-tractor built by Westfall Equipment Co., Portland, Ore. was one of the first applications of the new sumpless torque converter. The model 250A is a four-wheel drive unit built for mining, construction, logging and farming service and is powered by a Cummins NH 220 (220 hp, 2100 rpm) diesel engine. The dozer tractor illustrated is equipped with Westfall's own all clutch power shift transmission and Twin Disc torque converter providing eight speeds forward (0 to 31.5 mph) and four reverse (0 to 25 mph). No differentials are used and all four wheels "lock" for constant drive and must turn together thus providing traction regardless of condition or roughness of terrain. The Westfall units also have an automatic weight transfer feature which contributes to more draw-bar pull by shifting weight from the front wheels to the rear as soon as the load is put on. This provides equal traction on all four wheels under load, increasing the pulling power and maintaining the steering ease.



The model 250A Westfall mining dozer tractor with power shift transmission is one of the first to use Twin Disc sumpless torque converter.

This Diamond T model 931CN dieselized tilt-cab tractor hauls a double bottom rig from Fremont, Calif., to Vancouver, Wash., on a rugged run for the Kroehler Furniture Co. Tractor is equipped with Cummins NH-220 diesel engine, Spicer clutch and transmission, Eaton rear axle.

HIGH CUBE BRINGS LOWER COSTS

KROEHLER Manufacturing Co., among the world's largest furniture makers, caused truckers to sit up and take notice recently—merely by achieving an efficiency resulting in a substantial cost reduction for the company. With the double rig shown, Kroehler is pioneering for the furniture industry, and for the trucking industry as well. Length law liberalization in 11 western states enabled the furniture maker to achieve the maximum "cube" for peak economy in hauling bulky, uncrated furniture.

This dramatic new operation started when M. A. McCorkel, the firm's general trucking superintendent, got together with Trailmobile engineers. Past experience and some close figuring pointed up that 27 ft. doubles should hold some 60 suites (sofa and chair) of furniture, complete with many layers of thick, soft padding to protect the upholstered pieces in transit. Kroehler trailers, built by Trailmobile, are special drop-floor units. They are a full 27 ft. in length, 13 ft. 6 in. high, and 92 in. wide inside. All of which adds up almost 5400 cu. ft. of useable space, nearly as much as is in an average five-room house!

The trailer problem solved, selection of the power unit was next on the agenda. A careful analysis of the situation indicated that the tractor chosen would have to meet a number of rigid requirements. It would have to be a true heavy-duty unit capable of taking in stride the miles of mountains between Fremont, Calif. and Vancouver, Wash., the rig's beat. Economics dictated that it have a diesel engine, and that it must be both highly maneuverable and close-coupled to handle the train within the 65 ft. permissible length. And the tractor had to be a sleeper-cab job.

Diamond T's new tilt-cab diesel model 931CN was selected. In addition to being a lightweight vehicle (not of too much importance in this instance), this new Diamond T offers numerous other advantages. The front axle is set well forward for maximum loads and trailers under bridge-formula restrictions, the tractor incorporates heavy-duty construction and road-proven components, and there is power to spare. Engine is the Cummins NH-220, "work horse" of heavy trucking, and the entire power train is matched and balanced for optimum performance and the requirements of this particular job. Among components used are the 12-speed Spicer Synchromaster transmission, Spicer 14 in. 2-plate clutch, and an Eaton 1911 rear axle.

In a maximum-length doubles operation, inches are vitally important. Dimension-wise, the Diamond T 931CN is ideal, for even with a 25 in. sleeper berth, the BBC measurement is only 73⅝ in., which permits ample freedom of king-pin positioning and adequate clearance between tractor and trailer, and between the two trailers. Train length is 65 ft. The quantity of furniture hauled per load—some 60 suites—pleases Kroehler, for this is a *real* load (considerably more, for example, than could be handled by a railway boxcar). Of prime importance too, is the reduction in loading and handling costs, for trailers are loaded for retail delivery right at the Fremont plant. This means that furniture is put aboard in reverse order from which it is to be unloaded. At the northern end of the run the two trailers are "dropped" at Vancouver, and a gasoline tractor takes the individual trailers (one at a time) on their separate ways, traveling routes which permit them to make retail deliveries at dealers from Bellingham, Wash. to Eugene, Ore. without handling the furniture from the time it was loaded at Fremont.

After dropping the two "boxes", the big Diamond T diesel heads back for Fremont where another pair of 27 ft. trailers is being loaded on a timetable which permits the 931CN to operate on a turn-around basis. This return trip includes an empty pair which has concluded the retail run.

M. A. McCorkel, Kroehler's transportation specialist, heads up the operation of the country's seventh largest private fleet. The far-flung units, numbering 270 tractors and 350 trailers, move mountains of furniture to thousands of stores in every state, with an annual fleet mileage near 10,000,000 mi. Kroehler's headquarters is at Naperville, Ill.

CATERPILLAR REORGANIZES ENGINE SALES GROUP

SEVERAL top organization changes in its Engine Sales Department have been announced by H. H. Howard, vice president of Caterpillar Tractor Co., in charge of the company's Engine Division. "These changes," according to Howard, "more clearly define our objectives in the sale of diesel and natural gas engines, and our new engine plant near Mossville, Ill. has given us the opportunity we've needed to expand both in the manufacturing area and in personnel". In addition, the new organization will provide more assistance to dealers as well as more aid to original equipment manufacturers since this Division's responsibilities are now tailored especially for this market. Caterpillar plans to increase engine sales through use of compact, high output units and is steadily increasing the size and horsepower range of its line to provide a well rounded selection of power units.

To facilitate the operations which are essential to the Division's sales program, the sales department has been divided into three important sections, each headed by a division manager and all serving under Fred V. Jacobs, newly appointed Engine Division sales manager. Mr. Jacobs moved in from manager of Caterpillar Tractor's Sales Development Division to replace Jack H. Gill, who has been promoted to assist Howard in a staff position with a wide variety of Engine Division functions. Mr. Bob Cumming, formerly assistant sales manager, takes over as manager of the Manufacturers Sales Division. Mr. Hugh Rose, who was the Engine Division's sales co-ordinator, is now manager of Caterpillar Dealer Sales Division. The third division, Sales Development, is headed up by Gene Sterrett who moved into the industrial engine plant from Tulsa where he served as a field representative for Caterpillar.

Henry H. Howard

Jack H. Gill

Fred V. Jacobs

R. E. Sterrett

Hugh Rose

R. A. Cumming

Each of the three sales divisions is fully staffed with personnel permanently stationed both at the plant and in the field with specific responsibilities for that division's phase of activity only. Increased specialization of activities is one of the benefits of this organization. Coincident with these changes was the appointment of a new engine dealership, Ingersoll Corp. of Shreveport, La., which was engaged to concentrate on engine sales exclusively.

An extensive program has been announced to further train dealer sales personnel. Mr. Ken Grimes, manager of Engine Division's sales training group, has announced a significant increase in his staff to instruct these people and to prepare sales aids for their own training use.

The new industrial engine plant near Mossville, Ill., is the most recent addition to Caterpillar's engine manufacturing facilities. The addition brings to nearly 3,000,000 sq. ft. Caterpillar's manufacturing area devoted to engine construction.

DIESEL SERVICE PROGRESS

A COMMENTARY BY **GEORGE R. MACKEY**

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Smoke, Smog, and Horsepower

DURING the last few years a great deal of print has been devoted to internal combustion engine exhaust and its contribution to air pollution or "smog". Even though the cars on our highways eject tons of contaminants into the air every day, the visible exhaust of a diesel truck is generally subjected to more notice and criticism even though it may only be a haze. Generally, the exhaust from an average car engine during continuous acceleration, deceleration, and idle, as is common in normal city traffic, will contribute far more contaminants to aggrevate air pollution than would the largest diesel truck operating under similar conditions. However, to the average person it is the visible diesel exhaust and not the gasoline engine exhaust that is the principal offender, even though the industry recognizes the gasoline engine as a major contributor.

An understanding of the different principles of combustion in a carbureted engine and the diesel cycle would enlighten the minds of many. For example, the diesel engine during normal operation always breathes more air than it actually needs, but the gasoline engine must always maintain a theoretical 15 to 1 air-fuel ratio. During the operation of a diesel engine, with its abundant supply of fresh air, the amount of fuel injected is infinately variable, depending on the power demands. At idle, the amount of fuel injected is just enough to maintain the idle speed. During continuous cruise or full power operation, the fuel injection is controlled for the given power output of the engine. Compare this to our popular gasoline engine which during idle operation runs on a 11.8 to 12.8:1 air fuel ratio; or during cruise conditions averages between 12.5:1 and 14:1; or while operating at full throttle averages between 12.5: and 13.8:1 air fuel ratio. Another difference often overlooked is that even during deceleration of a gasoline engine, a measurable amount of fuel is always passing through the engine and exhaust to atmosphere, while the fuel injection in a diesel engine is practically cut off during deceleration. Another important factor, generally not considered, is that most trucks operating on our highways and city streets are better maintained than the average car on the road. Diesel truck shops throughout the country invest many thousands of dollars annually for such equipment as fuel flow meters and dynamometers to assure proper performance, maximum economy, and elimination of exhaust smoke. A recent test on hundreds of average cars showed that a very large majority were operating with extremely rich carburetion; generally this excessive rich fuel air mixture did not show as exhaust smoke.

Regardless of what may be said about diesel or gasoline operating efficiency, or manufacturers research and engineering investments to continually improve performance, or the expenditures and efforts to provide trained technicians to service the modern diesel, there is always a number of "know it all, old fashioned" operators and mechanics who firmly believe that a diesel engine is not developing its rated horsepower unless it has a smoky exhaust. This type of individual naturally thinks he knows more than the manufacturer and will always exceed a specified fuel injection rate to try to get more power. It is doubtful that this type of individual ever refers to a manual or is familiar with procedures for adjusting fuel injection to compensate for altitude or other performance variables. Furthermore, he will have little or no regard for operating economy, engine life, or maintenance costs.

Ringleman Type Smoke Chart. The cut illustrates the appearance of the chart but reproduction has somewhat changed the value of the shades. Persons interested in receiving copies of the chart can do so by writing DIESEL AND GAS ENGINE PROGRESS.

No. 1 - 20% DENSE
No. 2 - 40% DENSE
No. 3 - 60% DENSE
No. 4 - 80% DENSE
No. 5 - 100% DENSE
COPYRIGHT 1949, FLORIDA JOINTLESS FIBREBOARD CO., CHICAGO, ILL.

A Ringelmann type Smoke Chart, for estimating exhaust smoke density has proven extremely valuable to diesel engine and truck shops for testing exhaust smoke and making exhaust smoke analysis. In some metropolitan areas, traffic patrols and air pollution patrols are also using this type chart to stop violators of local smoke ordinances. These patrols view a vehicle's exhaust through the hole in the center of the chart, and compare the density to the various shades shown on the chart. Generally, smoke of 40 per cent opacity or greater is a violation and is handled accordingly; mostly in the manner of a warning or citation. Many fleet inspectors are also using these charts to check their truck operation on the road. To them, excessive smoke may indicate over-fueling, poor maintenance, or improper operation, such as lugging. To aid in this phase of fleet operation, many truck and diesel engine service shops throughout the country use the chart to demonstrate proper or improper operation or adjustments; then, present the chart to the fleet for a continuation of such checks. The demonstration is generally made with the vehicle operating on a chassis dynamometer where all types of road performance from deceleration or cruise to maximum power are duplicated and the corresponding exhaust density measured. This approach to exhaust analysis and pointing out the causes for excessive smoke has proven to be valuable to the service operation and the fleet.

By pointing out the causes and selling the corrective service, the service organizations are experiencing additional volume; the fleets are enjoying better performance, greater operating economies, and less warnings or citations for smoke violations.

Even though visible exhaust smoke may often be the subject of conversation, the thing that is often overlooked, or maybe not considered, is that the smokey exhaust is an indication that something is wrong. While the color of the smoke exhausted to air is a gauge of engine performance or maintenance, of far greater consequence is the increased maintenance and operating costs, or shortened en-

gine life caused by the harmful effects of deposits and contaminants that remain in the engine. Accurate diesel exhaust smoke analysis can only be made with the engine operating at recommended temperatures, and during full load or maximum power operation. Such conditions can only be obtained while the vehicle is operating at full power on the road or on a chassis dynamometer. The analysis of exhaust smoke becomes relatively simple when we consider that satisfactory performance of a diesel engine and its ability to develop rated horsepower depends basically on three important functions: (1) Proper breathing; that is, adequate air supply to each cylinder, and the expelling of exhaust gases, (2) sufficiently high compression to assure proper combustion, and (3) the injection of a measured amount of fuel at the proper time into each cylinder. Exhaust smoke is a visible indication of engine breathing, combustion, fuel injection, or lubricating oil entering the combustion chamber or carried out with the exhaust gases.

As a guide to incomplete combustion or causes of excessive exhaust smoke, the following guide can be used:

Black or Grey Smoke
1. Insufficient Combustion Air
   a. Air inlet restriction
   b. High exhaust back pressure
2. Excessive Fuel or Irregular Distribution
   a. Improperly adjusted pumps or injectors
   b. Improper injection timing
   c. Faulty fuel injection
3. Lugging Engine
4. Improper Grade Fuel

Blue Smoke
1. Internal oil leaks
2. Low operating temperatures

White Smoke
1. Faulty injection
2. Low compression
3. Improper grade fuel

Overfueling of diesel engines is a contributing factor to excessive exhaust smoke. Only by strict adherence to engine manufacturers fuel consumption versus horsepower specification, can continuous economical performance and long engine life be assured. Complete combustion must take place in the cylinder, not in the exhaust system. Sufficient air and proper fueling results in rated power and long life. Insufficient air and overfueling will result in short engine life, high maintenance and operating costs, and in many areas, citations for smoke violations.

Heads Sales Department

T. J. Josalle

T. J. Josalle has been appointed to the newly created post of general sales manager of Aeroquip Corp.'s Marman Division, Los Angeles, Calif. Mr. Josalle has been associated with the company for ten years, and was formerly aircraft sales manager of the division. As general sales manager, he will be responsible for the company's world-wide aircraft and missiles sales, as well as industrial and commercial sales programs.

WHEREVER
engines are used . . .
VAPOR PHASE®
systems can cut operational costs

VAPOR PHASE COOLING CAN GIVE BETTER ENGINE PERFORMANCE

Vapor Phase cooling systems take advantage of the natural law of boiling liquids to maintain a constant temperature through the water jacket of an engine. Whereas with conventional cooling systems the cylinder wall temperature may vary as much as 40 degrees between the top and bottom—there is a difference of less than 5 degrees with Vapor Phase. By maintaining this constant high temperature, well above the dew point of exhaust gases (194°F.), condensation and the resultant acid formed are eliminated. This means less engine wear—faster warm-ups—better performance—less maintenance. Engines that normally would have required a major overhaul at 8000 hours have operated for more than 25,000 hours before being overhauled.
Another advantage to Vapor Phase is that with jacket temperature maintained at 212° F. to 250° F., depending upon the installation, engines can operate on low grade fuels such as sour gas, sewer gas and Bunker C fuel.

WASTE HEAT RECOVERED BY VAPOR PHASE SYSTEMS CAN PERFORM MANY JOBS

Vapor Phase Cooling Systems recover the Jacket Heat and much of the Exhaust Heat which is normally wasted and convert it to useful purposes. SPACE HEATING—In the Aleutians, for example the United States Air Force uses waste heat recovered by Vapor Phase to heat the living quarters of the men in the Radar Stations. No other source of heat is necessary. WATER DISTILLATION—Aboard ship and in remote areas Vapor Phase Systems supply the heat necessary to distill potable water. SLUDGE HEATING—Sewage treatment plants use waste heat recovered by Vapor Phase to heat sludge before it enters the digester, thus eliminating a boiler and the fuel needed to heat it. PETROLEUM PROCESSING—Waste heat recovered by Vapor Phase is used in the petroleum industry to heat oil for some treating processes. AIR CONDITIONING—Vapor Phase recovered waste heat can operate the water chillers for an air conditioning installation.

HOW CAN VAPOR PHASE HELP YOU?

The uses to which Vapor Phase Cooling and Waste Heat Recovery Systems can be applied are increasing every day. Find out more about it; write for the full story on Vapor Phase economy in your operation.

"Sole developers and manufacturers of Vapor Phase Thermal Circulation (Ebullition) Engine Cooling Systems"

E C VAPOR PHASE

ENGINEERING CONTROLS, Inc.

611 E. Marceau, St. Louis 11, Mo. — P. O. Box 1310, Santa Monica, Calif.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

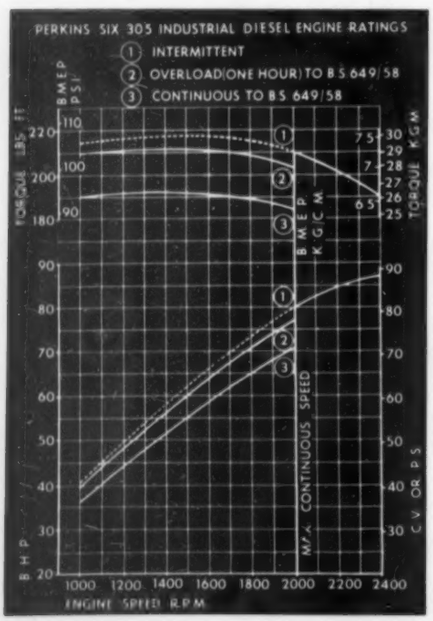
Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

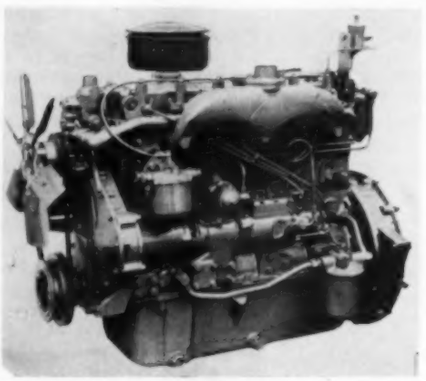
A Large Perkins Industrial Diesel Engine

IN January this year we published details of a number of new additions to the Perkins range of diesel engines including a marine unit in their Six-305 series which was introduced at the London Boat Show early this year. An industrial version of this new design has now been announced by Perkins, giving 87 bhp at 2,400 rpm. This is a 6 cylinder design based on a cylinder dimension of 3.6 ins. bore by 5 ins. stroke giving 5 cubic litres piston displacement.

It is intended for a wide range of applications including earth moving equipment, fork lift trucks, mobile cranes etc. and a wide selection of flywheels and flywheel housings to suit these applications will be available. The engine will also be sold in stage-by-stage form to build up into a complete power pack.

Either hydraulic type governors suitable for industrial equipment requiring speeds in excess of 2,000 rpm or a mechanical governor for applications such as generating and pumping which need close governing will be available.





Perkins Six-305 industrial diesel engine

Small Aircooled Diesel

An addition to their range of small diesel engines has been announced by Bamfords Ltd. of Uttoxeter, England, which will provide 6½ bhp at 1,800 rpm. It is a single cylinder four-stroke aircooled design based on cylinder dimensions of 3½ ins. bore by 4¼ ins. stroke.

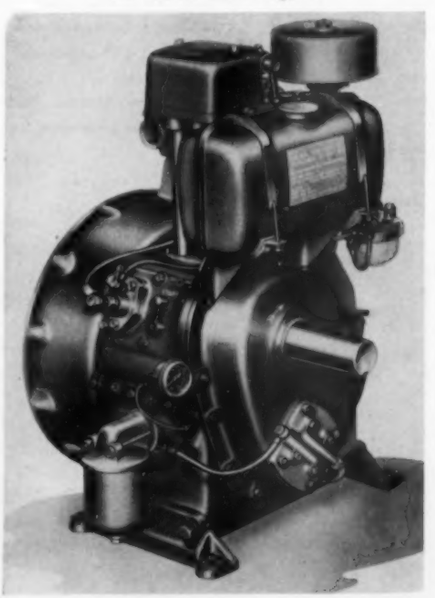
Aircooling is provided by a flywheel type of fan, the fins being cast integrally with the flywheel to direct cooling air to the cylinder barrel and head through removable ducting. Both the cylinder barrel and the head are of high grade cast iron and heavily finned, cast iron also being used for the crankcase. The latter incorporates a removable inspection cover to give access to the connecting rod, big end bearing and internal oil filter. An overhead valve system is employed, the heat resisting steel valves seating directly in the head. The inlet valve is shrouded to promote efficient combustion. A multihole C.A.V. injector is positioned to provide maximum cooling and injection is direct into a combustion chamber formed in the crown of the piston. The piston is of low expansion aluminum alloy and is fitted with three compression, two scraper rings and a fully floating gudgeon pin to secure it to the connecting rod. The top compression ring is chromium plated. The connecting rod is a steel stamping of H section with the big end split diagonally to facilitate assembly. The big end bearing is steel backed copper lead with tin flashing and the small end bearing is a lead bronze wrapped bush.

The steel crankshaft has a hardened crank pin and is counter balanced. It is carried in steel backed, prefinished white metal bearings. Prefinished lead bronze bearings carry the high tensile camshaft on which the cams for the valves and fuel pump are ground as an integral part of the shaft. The valves are operated through a conventional system of tappets, push rods and rockers. Engine lubrication is supplied by a gear type oil pump through a full flow filter to the main bearings and big end and camshaft bearings. A metered supply of oil is fed to the valve rocker gear and an oil jet feeds the half speed gears, all other parts being lubricated by splash.

All the fuel injection equipment is of C.A.V. manufacture. A fuel filter is incorporated in the supply line. The governor and fuel pump are totally enclosed to form an easily detachable assembly on the crankcase and the governor is driven directly from a gear on the camshaft.

Drive arrangements are from the flywheel end of the crankshaft through an extension shaft, from the half-speed shaft or from a pully bolted direct to the flywheel.

Bamford's new AC1 single cylinder air cooled diesel engine.



HIGHER PERFORMANCE WITH SMALLER TURBOCHARGERS

AiResearch's new line of high performance turbochargers gives higher air pressures and more flow per size and weight than ever before achieved in the turbocharging industry, while retaining the high standards of durability which AiResearch established in this field.

Designed for the 50-700 hp engine range, the turbochargers incorporate (a) low inertia, low stress, high pressure ratio impellers and turbine wheels, (b) free vortex turbine housings which eliminate nozzle rings and provide higher turbine efficiency.

Other advantages:

Lower Cost—Radically simplified design and high production tooling have significantly lowered unit cost and service requirements.

Faster Response—Lowered inertia of the rotating group has made response almost immediate.

Greater Versatility—Interchangeable compressor components for each basic turbocharger housing permit a perfect matching of turbocharger to the job; and better engine matching further reduces operating cost.

These new, high performance turbochargers are readily adapted to AiResearch turbocharger control systems which insure optimum engine characteristics over the entire range.

World leader in the development and manufacture of lightweight turbomachinery of all types, AiResearch now has more than 35,000 turbochargers in the field delivering nearly 9 million turbocharged horsepower.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

Will Build "Overland Train"

A new type overland train powered by a gas turbine-electric plant, has gone into production, according to an announcement made by R. G. LeTourneau, Inc. It will be the Army's largest rubber-tired land vehicle, will consist of 13 cars and be 560 ft. long. A deviation from the earlier Army Transportation Corps train is use of gas turbines. Four Saturn gas turbine engines, manufactured by Solar Aircraft Co., will drive the generators supplying current for the electric wheels, steering, and other electrical accessories. The engines, which develop more than 1,000 hp each, weigh approximately 1,400 lbs. An auxiliary generating plant is located in the control car to provide sufficient power for that car to propel itself and one cargo car when detached from the rest of the train. Accommodations for a six-man crew, controls for the entire train, and complete communications and navigation systems are located in the control car. Although details of its application have not been revealed, completion of the multi-unit carrier will provide the army with a cargo vehicle capable of operation in remote areas over varied terrain where supply routes are long, fuel supplies limited, and roads non-existent, according to LeTourneau. A smaller 4-unit train, delivered to the Army Transportation Corps in 1956 by LeTourneau, has undergone a rigorous testing program on the Greenland ice-cap, and elsewhere. A feature which makes the 13-unit train possible, is use of 54 independent drive wheels, each having a high-torque electric motor geared directly to its rim. Each electric-wheel receives power through flexible electric cables, thus space and length limitations associated with mechanical power trains are virtually eliminated. One man, at an electric console in the lead car, will operate the train.

Precision tracking ability of trailing cars is demonstrated in "S" maneuver by model of new "overland train" design. Scale model of jeep and driver indicates comparative size of completed logistical cargo train which is being constructed for the Army by R. G. LeTourneau, Inc., of Longview, Tex.

Sales Engineering Manager

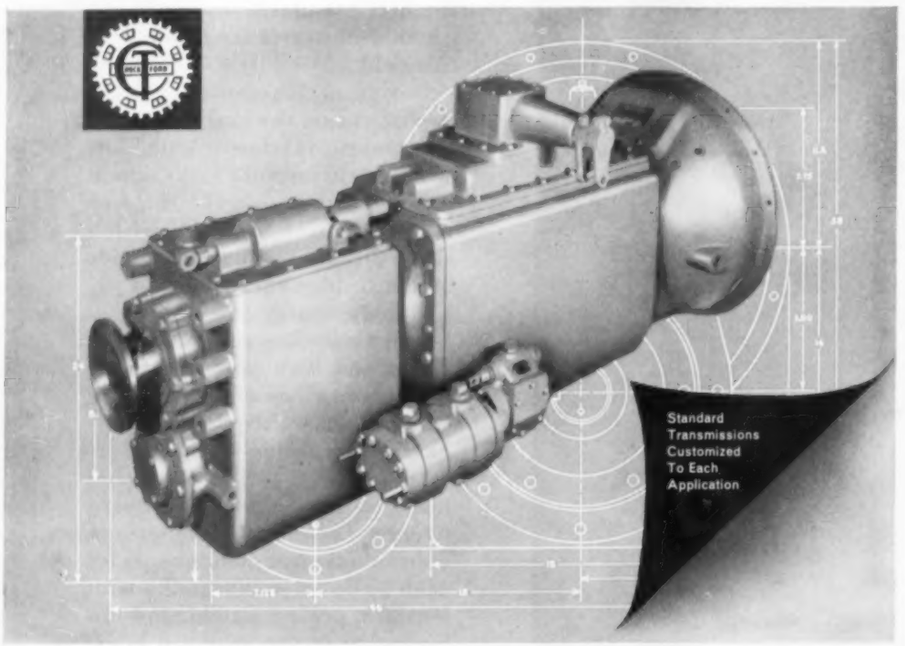
G. R. Holly

Gerald R. Holly has been named manager of sales engineering for the Detroit Diesel Engine Division of General Motors Corp. Mr. Holly has been general supervisor of specifications and price analysis since 1959. Prior to that time he was zone sales manager working out of Detroit Diesel's San Francisco regional office. In his new position Holly will be responsible for the Division's application engineering function, product pricing, forecasting, order processing, and data processing.

Filter Survey Service

Selection of the oil and air filter cartridges for diesel engines has been greatly simplified, reports the Wix Corp. of Gastonia, N.C. The filter cartridge manufacturer offers a tailor-made service for fleets and backbone of this program is a Fleet Survey Form that is used by a Wix representative to list the correct fuel, lube, or air replacement filter cartridge for every engine in a fleet. This

form is then typed at the factory and inserted in a protective plastic cover that can be hung by the operator at any convenient spot. A Fleet Manual is also supplied that contains loose-leaf pages for every engine. On these pages fleet personnel can record data on service checks, filter changes, maintenance, overhauls, and other mechanical details. Both of these services are available to fleets and contractors of all sizes and are free. For further information write Wix Corp., Gastonia, N.C.



Heavy-Duty Multiple-Speed Transmission

Cotta heavy-duty transmissions match high-speed engines to big-machine production

Balancing 2300 - 2400 rpm engines for best heavy equipment production is all in a day's work for Cotta heavy-duty transmissions. Why? Because Cotta transmissions are especially engineered to handle the severe shock loads common in today's big-machine operations.

Extra-wide gears absorb 150 - 2500 ft-lb input torque loads of drilling rigs, power shovels, rock crushers, and mining equipment. Large, multiple-spline connections on alloy steel shafts eliminate stress points and provide maximum concentricity of gears.

±.0005" tolerances aid efficiency

At least 400 - 500 inspections of each gearbox help maintain tolerances to ±.0005". That accuracy won't wear off — even after long, tough use! Closely spaced gear ratios provide the variable speeds required on rigorous big-machine production. And, hand assembly of all Cotta transmissions provides the dependability and efficient performance that pumps, generators, locomotives, off-highway trucks, and similar equipment demand for long hours of trouble-free operation in the field.

Diagrams sent free on request

See our Catalog No. 3A/Co in *Sweet's Product Design File*. Check the detailed descriptions and specifications on standard and custom applications. Then call Cotta (TWX-RK 7720 or phone WO 4-5671) for details on precision-built transmissions designed especially to handle *your* heavy-duty power problem.

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Pumping Locomotives Construction Drilling

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A precision-built piston and rod assembly for a GM Diesel engine

GENUINE General Motors parts, precision-built according to factory design, will prove to be the best wherever replacement parts are necessary.

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E. Don Tull is Elected Cummins Engine Co., President

E. Don Tull

Election of E. Don Tull as president of Cummins Engine Co., Inc., Columbus, Ind., by the board of directors of the firm has been announced by J. Irwin Miller, chairman of the board. Mr. Tull, one of the earliest of Cummins employees, will fill the vacancy caused by the resignation of R. E. Huthsteiner on February 29. The new president started with Cummins in 1928, working first in the shop. Since 1935, he has held various supervisory positions in the plant, before becoming manager-manufacturing in 1950. In 1952, he was promoted to vice president and general manager. He has been executive vice president since 1955. Mr. Tull has been active in the diesel industry, which he served in 1956 as president of the Internal Combustion Engine Institute, the industry's trade association. He has also served as alternate member of the Munitions Board Industry Advisory Committee for internal combustion engines. Mr. Tull becomes the fourth president of the 41-year-old firm, which has grown from 70 employees in 1928 to more than 5,100 today. Clessie Cummins, the founder and first president of the company, is retired and living in California. Mr. Miller became president in 1947, succeeded by Mr. Huthsteiner in 1951. The Cummins main plant is at Columbus, Ind., with overseas factories in Shotts, Lanarkshire, Scotland and Sao Paulo, Brazil.

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EXPERIENCE?

★ 20 YEARS OF IT! ★ 25,000 UNITS BUILT! . . . most of the earliest are still operating! ★ BILLIONS OF HOURS OF TROUBLE-FREE SERVICE! ★ MORE EXPERIENCE than any U. S. manufacturer . . . covering the whole field of turbocharging!

ACTION?

★ BOOST your diesel engine performance, output and operation with . . .

NO-1

Pierce Pickering Governor Co. Formed; C. R. Hintz to Manage

Mr. Leland E. Boren, president of Pierce Industries of Anderson, Indiana, has announced the acquisition of Farris Pickering Governor Co. Effective as of March 1, 1960, the new firm is known as Pierce Pickering Governor Co. and it will have its sales, engineering and manufacturing headquarters in Palisades Park, N.J. Vice President and Secretary-Treasurer of the new Pierce Pickering organization is James Hale. Mr. C. R. "Bud" Hintz has been appointed Manager, and Ernest Massardo, Chief Engineer. According to Hintz, "the Company expects to extend its line to include governors to meet all prime mover control requirements." The governors, as now offered by the company, cover a wide range of mechanical and hydraulic speed control. Included in the line are the type 4300 hydraulic and type 2300 mechanical speed droop governors; the type 3300 constant or variable speed hydraulic; the type 5100 with electric overspeed trip; plus the 3700 hydraulic, the 3200 hydraulic, and the 2200 and 2600 mechanicals.

New "Payloader" Tractors

According to the manufacturer, The Frank G. Hough Co., Libertyville, Ill., the series B models of the H-70 and H-90 "Payloader" tractor-shovels offer improvements which increase production and better the performance of these four-wheel-drive units. While operating capacity of the H-90 series B unit remains at 9,000 lbs., the peak lift has been increased to 18,000 lbs. This model has a longer wheelbase and wider tread. Additional power is provided by a new Cummins turbocharged diesel engine which develops 162 hp at 2,100 rpm. A GM diesel, which develops 153 hp at 2,200 rpm is offered as an option. Improvements in the full power-shift transmission and the torque-converter are said to give superior throttle response and better operating characteristics according to the manufacturer. The H-70 series B "Payloader" retains the same recommended operating capacity of 7,000 lbs., but peak lift has been increased to 13,000 lbs. with improvements in the boom arm design and bucket control linkage providing additional digging power. More power is provided by a larger Cummins diesel engine which develops 124 hp. Optional power for this series B unit include an IHC gas engine and a GM diesel. For additional data and specification sheets, on either or both the H-70 and H-90 series B models, write to The Frank G. Hough Co., 913 Seventh Avenue, Libertyville, Ill. (ITS NEW)

New Line of Electric Controls

Akro Industries, Inc. recently introduced its new line of electric controls for all makes of engine-generator sets used in emergency standby power, portable power and special prime power applications. Pedestal mounted, floor and wall mounted units are available. Akro also designs and manufactures custom electric controls for automation and process controls, switchgear, motor controls, machine tool, J.I.C. cabinets, and commercial and marine switchboards. A special Akro design feature, utilizing prefabricated panel mounting plates and wiring harnesses, enables each control feature to be added like a building block, for easy installation of all recognized manufacturers' components. Akro's universal terminal blocks eliminate rewiring for instrument adaptations. One harness connects all basic equipment and supplementary instrument harnesses can be quickly added by following simple diagrams. The new Akro pedestal mounted generator control cabinets are designed for a wide variety of ac and dc applications, single or dual voltage, for generators up to 500 kw. Their controls assure stable voltage at any load within the generator range. The cabinets accommodate any combination of instruments, switches and voltage regulators. Floor and wall mounted units provide positive control of generators as one unit or in multiple units for large power installations. An illustrated 4-page folder containing complete information and specifications on these electric controls may be obtained by writing to Akro Industries, Inc., 406 The Arcade, Cleveland 14, Ohio. (ITS NEW)

Akro pedestal mounted generator control cabinet.

New International Series Of Off-Highway Trucks

A new 230 series of off-highway heavy-duty International trucks has been introduced by the motor truck division of International Harvester Co., it was announced by L. W. Pierson, manager of sales for the firm's motor truck division. The new series, which includes six basic models in both four-wheel and six-wheel design, offers gross vehicle weight ratings ranging from 46,000 to 73,000 lbs. Design features include diamond plate steel fenders, heavy-duty brush guard, double-channel heat-treated frame, two new rear axles and a broad selection of heavy-duty optional components. Gross vehicle weight of the standard 230 four-wheel model is 46,000 lbs. Standard F-230 six-wheeler is rated at 59,000 lbs. gvw. With optional 18,000 lb. front axle and 55,000 lb. rear axle, the six-wheel model offers a gvw rating of 73,000 lbs. Engine availabilities for both four-wheel or six-wheel models include Cummins NH, HR and NT series diesels. Power steering is standard equipment on all models in the new series.

New rear axle on the standard 230 four-wheel model is rated at 35,000 lbs. Its features include a cast steel housing, high torque capacity planetary double-reduction differential carrier, induction-hardened axle shafts and forced flow lubrication that insures an adequate supply of lubricant to all working parts of the axle within one-half revolution of the wheels. A new tandem rear axle, rated at 44,000 lbs., is offered on the six-wheel F-230. It features a planetary double-reduction tandem with the same long-life design as the new single axle.

International six-wheel F-230-D diesel truck has rear axle rating of 44,000 lbs.

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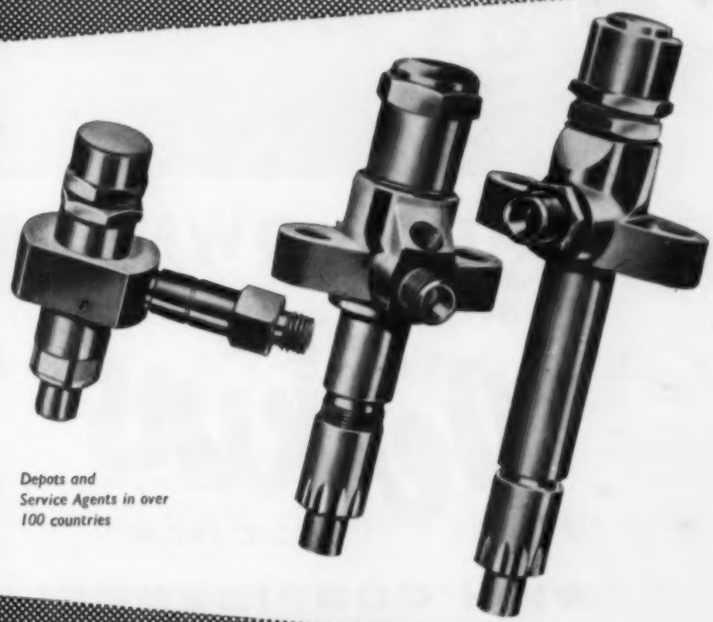

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Euclid Announces Variable Wheelbase Unit

Euclid Division of General Motors has announced addition of a new variable wheelbase machine to its line of off-highway rear dump haulers. Designated as the Model S-18, this new "Euc" consists of an overhung engine type tractor with an Easton-built semi-trailer. The S-18 tractor is powered by a GM 6-110 engine of 336 hp. It has an Allison 4-speed Torqmatic drive with converter lock-up, a Torqmatic brake is available as optional equipment. Top travel speed with full payload is 25 mph. Tractor and trailer tires are 27.00 x 33 and are interchangeable, for work requiring maximum traction and flotation, 33.5 x 33 tires are available as optional equipment. Euclid reports the S-18 rear dump is well balanced and provides exceptional maneuverability for close quarter work in mines, quarries, industrial and heavy construction work.

Hydraulic steering enables the tractor to make full 90 degree turns, the complete machine makes a non-stop turn in 34 ft. in hauling position. With hopper raised, turning width is only 28 ft. 8 in. since wheelbase is shortened by 6 ft. 6 in. The trailer has a capacity of 23 cu. yds.; heaped load is 26 yds. and rated payload is 70,000 lbs. A new single stage double acting hoist provides extremely fast and smooth dumping. The operator has full control of the body position through the entire dumping cycle. Wheelbase of the S-18 rear dump is 20 ft. in hauling position, with body raised to dumping position wheelbase is shortened to 13 ft. 6 in. Weights are 67,000 lbs. net, 137,000 lbs. gross with distribution of gross weight 50 per cent on both axles. Wheels, tires, brakedrums and related parts are interchangeable from scraper to rear dump. Complete specifications and performance data are available from Euclid Division, General Motors Corp., Cleveland 17, Ohio. (ITS NEW)

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Perkins has sales and service facilities in 143 countries. For details on Perkins Diesel Engines for Taxicab conversion, write:

F. PERKINS (CANADA) LTD.
60 WINGOLD AVENUE, TORONTO 19, ONTARIO, CANADA
Ask for address of nearest Perkins sales depot in U.S.A. 6005

Diesel for Emergency Shelter

Griffin Equipment Corp., of New York City, has supplied the Standard-Vacuum Oil Co. with a standby diesel electric power generating set for its newly completed national emergency shelter in its executive office building at Harrison, N. Y. The GM diesel unit will generate 50 kw and will switch

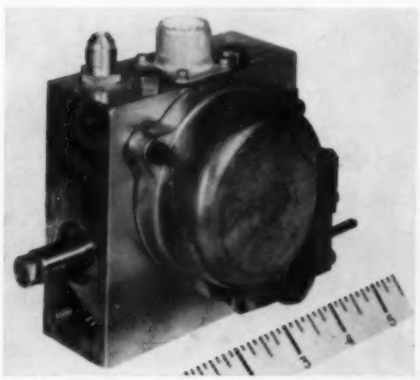
Field service technician giving diesel final test prior to installation. Upper right black box (with lights and dials) is remote indicator panel which, installed in shelter, will show action of set outside shelter. The other two cabinets are the automatic starting control panel and the generator control panel.

on automatically if the regular power should fail. The power plant, believed the first such installation in the New York-New Jersey metropolitan area, has been placed adjacent to the shelter, and will provide light, heat and purification of the air in the new emergency quarters. The diesel engine installation operates on regular oil burner fuel, the same as that used to heat the whole building, and is equipped to be cooled by water drawn from private wells. If normal air conditioning equipment is functioning, water used therein can also be used to cool the diesel, but if conditioning should be inoperative, a thermostat will automatically bypass the air conditioning and route water to the diesel's heat exchanger.

New Electric Governor

A universal electric governor (model EFG) for use on diesel engines, gasoline engines, steam turbines and gas turbines is available from the Westinghouse Electric Corp. The new unit is designed for constant speed control over a 10 per cent range in 400 cycle service, and over a 30 per cent range in 50/60 cycle service. Sensitivity and response characteristics of the governor are measured in milliseconds. The frequency circuit operates within three milliseconds of the time that even the smallest speed change occurs. Full movement of the throttle from closed position to open position (and vice versa) is accomplished in 0.035 seconds. In addition, the high sensitivity of the EFG governor improves the speed regulation of slower speed engines under 720 rpm. Another important advance in the new unit is the development of a transducer (differential transformer) element which replaces the wire-wound feed-back potentiometer. With no exposed wires or forced rubbing contact, this element gives increased service life. Some of the features of the model EFG electric governor include standard design universally adaptable to prime movers of any make or model; isochronous in single unit or parallel units operation; independent of throttle linearity; independent of load balance per phase and load power factor; and maintaining constant speed to full capability of the engine to carry the load, including overload.

The electric control unit is the sensing element of the electric governor; it mixes and amplifies signals. The electrical summation of these variables is magnetically amplified and the resulting error signal is applied push-pull across the hydraulic actuating unit, below.



The model EFG governor does not require an accurate and sensitive speed drive accessory in the engine, as do conventional hydraulic governors. For further information, write Westinghouse Electric Corporation, P.O. Box 2099, Pittsburgh 30, Pa.

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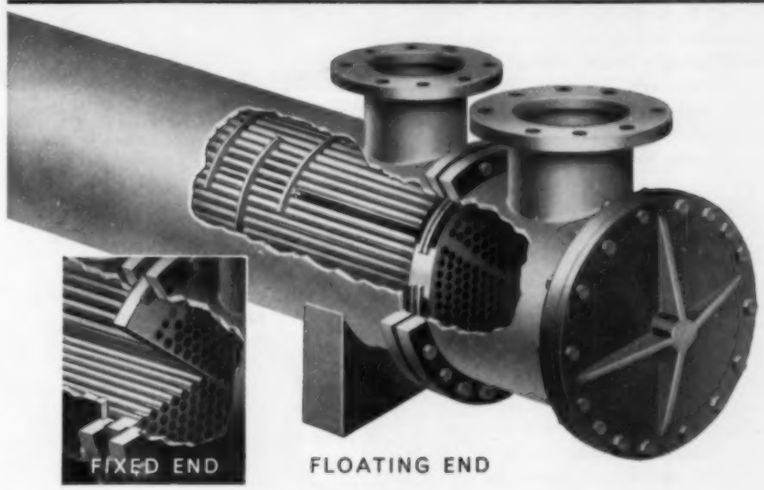
PERFORMANCE THAT CREATES SATISFACTION!



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STEEL SHELL FLOATING HEAD • STRAIGHT TUBES

- Lantern gland type floating head permits free expansion and contraction and prevents mixing of fluids.
- Available with ⅜″, ⅝″ and ¾″ O.D. bare tubes as well as ⅝″ O.D. finned tubes. Diameters to 31″.
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- Ask for Bulletin HT-5.

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ORE CARRIER CONVERTED FOR CEMENT

ALTHOUGH she bears the same lines as when the ship was used as an ore carrier, the *J. B. Ford,* bulk cement self-unloader on the Great Lakes, has undergone a lot of changes below deck. The *Ford,* owned by the Huron Portland Cement Co., of Detroit, went into service for the firm last May after undergoing extensive revamping work at the Christy Corp., yards, Sturgeon Bay, Wis. Included in the work on the 440 ft. coal-fired vessel was installation of a 1000 kw Nordberg diesel generator set to power the newly installed unloading machinery.

The *Ford* was built in 1904 for the Pittsburgh Steamship Co. and was purchased by Huron in 1956. Known then as the *E. C. Collins,* the ship was laid up in Buffalo until early 1959 when she was towed to Sturgeon Bay. Superstructure and hull lines were unchanged by the work; the only change above deck was in the deck itself with the open hatch type deck replated with a solid deck. Below deck the cargo holds were rebuilt to accommodate a new longitudinal tunnel running the length of the holds amidships. A new engine room space was also built to accommodate the generator set and driving machinery for the screw conveyors.

The 12 existing cargo hatches, each 9x32 ft. with sliding leaf covers were removed by cutting away existing coamings. New channel deck beams were installed to line up and connect to existing beams at the hatch sides. All Harriman arches were removed and the converted deck supported by a new centerline bulkhead. Then the deck was penetrated with many small loading hatches, each about 14 in. diameter.

At right angles to the tunnel, small cross tunnels or troughs were installed to receive patented air slides which carry cement out of the hold. The main tunnel encloses the screw conveyor boxes, cement flow controls and operating panels for unloading and is the control center for operating the Huron-developed unloading system.

Electric power for unloading is supplied by a 1000 kw generator set installed in the new machinery space forward of the coal bunker bulkhead. The set consists of a Nordberg model FS-136-HSC turbocharged six-cylinder diesel engine driving a 1000 kw Allis-Chalmers generator and exciter. The four cycle Nordberg Supairthermal engine is rated 1450 hp at 514 rpm, has a bore and stroke of 13½ x 16½ in. and is directly connected to the generator. Power from the generator is fed to a series of electric motors which drive the screw conveyors to carry cement out of the holds. The engine generator set is a compact, independent operating unit with engine, generator, gauge board and auxiliary equipment mounted on a common sub base.

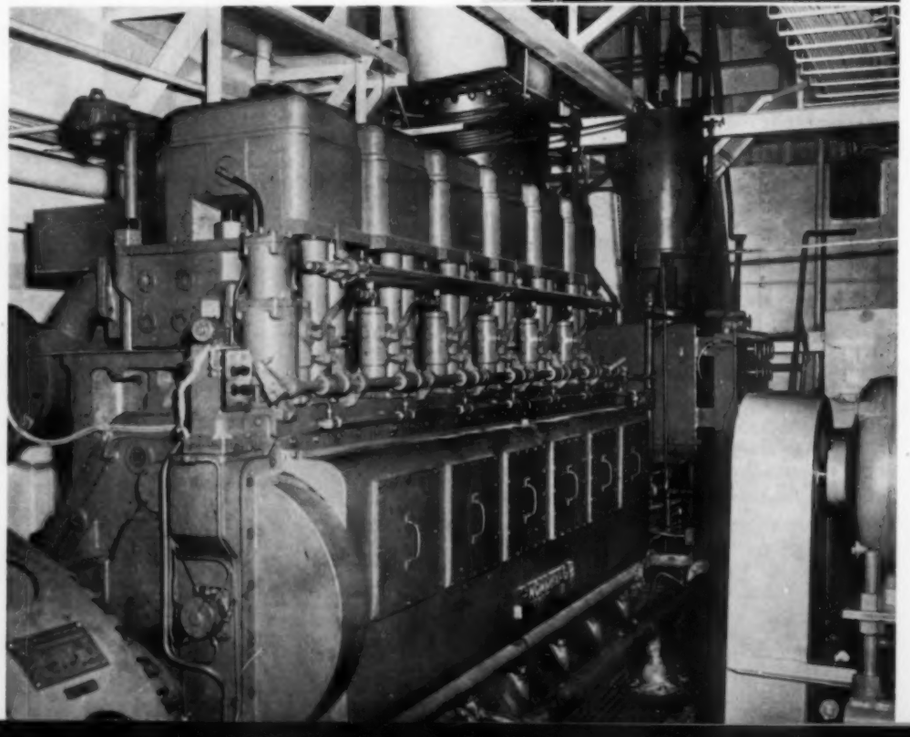
The *J. B. Ford* leaves the Christy Co. yards after conversion to a cement self-unloader. She is the second vessel to be converted by this yard for Huron Portland Cement Co.

The coal burning *Ford* displaces 7,945 tons and can carry about 46,000 bbls of bulk cement. She is 440 ft. long, has a 50 ft. beam and 28 ft. draft.

Principal Equipment Serving Nordberg Engine

Turbocharger	Elliott
Governor	Woodward
Generator	Allis-Chalmers
Fuel injection pumps	Bendix Scintilla
Fuel oil filter	Nugent
Fuel oil cooler	Ross
Heat exchanger	Ross
Lube oil filter	Winslow
Thermostatic controls	Fulton-Sylphon
Air intake filter	Burgess-Manning
Exhaust muffler	Burgess-Manning
Engine alarm system	Brown
Exhaust pyrometer	Alnor

Control center for cement unloading operations is this tunnel which runs length of cargo hold amidships. Tunnel contains controls and operating panels for Huron-developed system.



Shown installed on the *J. B. Ford* is the Nordberg diesel engine rated 1450 hp at 514 rpm. The engine drives a 1000 kw Allis-Chalmers generator. Note Woodward governor and Bendix Scintilla fuel injection pumps.

NEW from Cummins!
Only from Cummins!

The first V diesels of their size and h.p. built

VT 8.4

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V8.

430 h.p.

350 h.p.

VT8-430

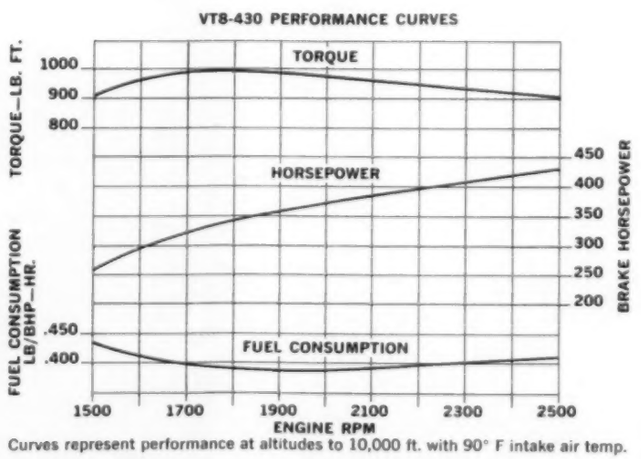
THE DIESEL THAT DELIVERS THE PERFORMANCE OF ENGINES WITH *4 MORE CYLINDERS!*

430 horsepower! 990 ft. lbs. peak torque! 950 cubic inch displacement! 7 lbs. per h.p.! Less than 59 inches long! Put these facts together and you have the rugged Cummins VT8-430 TURBODIESEL® Engine—the diesel that's as much as 40% smaller and more compact than engines in current use delivering equal power.

From its very concept, the VT8-430 was designed to give you the benefits of turbocharging. Not only does turbocharging pack more power into the engine, but it assures full rated horsepower up to 10,000 feet. Cummins engineers have developed a lightweight, perfectly-balanced turbocharger that gives fast acceleration—trouble-free performance. Further, the VT8 operates at low exhaust temperatures assuring long life for both the engine and turbocharger.

Cummins puts the accessories on top of the block, in the "V" formed by the cylinder banks. This means greater accessibility, easier maintenance, less costly repairs. Internally, new insert-type injectors are much easier to install and service. Wet-type liners require less time to remove, less care to install. These are only few of the many advantages of this new Cummins Construction Diesel.

All in all, the VT8-430 gives you a combination of high performance, low fuel costs (see chart below), long operating life as well as a lower initial investment than the larger engines in its power class. You can't beat this kind of economy!



Curves represent performance at altitudes to 10,000 ft. with 90° F intake air temp.

V8-350

NEVER BEFORE, SO MUCH POWER FROM SUCH A COMPACT, NATURALLY-ASPIRATED DIESEL!

Here's rugged construction power! 805 ft. lbs. peak torque —*naturally!* (See curves below.) Like the VT8, this engine has a piston displacement of 950 cubic inches and rotates at 2500 rpm. This produces 350 horsepower in a package that's less than 57 inches long.

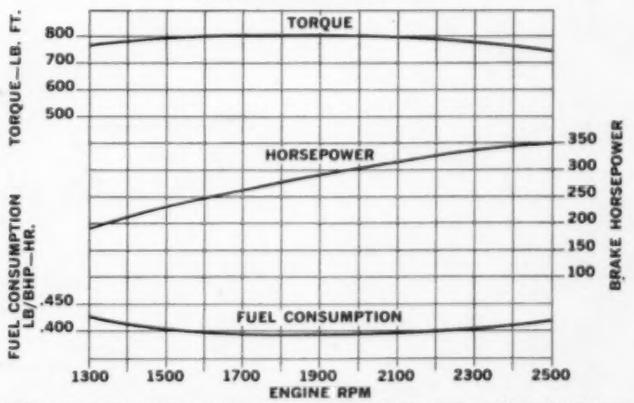
The V8-350 has many new features to reduce operating costs. New internal fuel and oil lines eliminate threaded connections, damage to exposed lines. Cummins own 12 cfm air compressor is supplied on both engines. Of simple, one cylinder design, here is the only unit in the trade backed by a 3600 hour or one year warranty.

Another practical advantage of the V8 Diesels is the 2500 rpm. This gives you an ideal relationship of horsepower, torque and speed to permit the use of lighter, more compact, less costly transmissions. In other words, your initial investment is reduced as well as the maintenance cost during operating life.

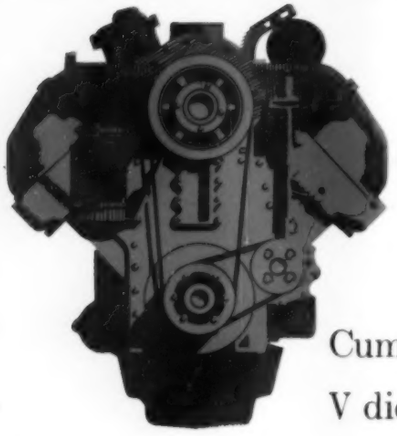
Cummins exclusive PT fuel system also reduces maintenance and fuel costs. It operates on lower priced No. 2 diesel fuel . . . has fewer parts than any other diesel fuel system. The pump is mounted in the 90° angle formed by the cylinder banks. Also possible, on the V8-350 . . . either the intake or exhaust manifold can be placed inside the "V" to fit your application requirements.

Get the complete profit-making story on these new compact V diesels, and on the models in which they are available, from your nearest construction equipment representative or Cummins Distributor.

V8-350 PERFORMANCE CURVES



Ratings corrected to conditions of 29.92" hg (sea level) barometric pressure; 60° F intake air temp.



Cummins has done it again! Built two V diesels in the much needed 350-430 horsepower class especially for construction machines. This opens a new world of *Cummins Diesel economy* for big scrapers, off-highway trucks, shovels, front end loaders and other equipment where there has been a demand for compact yet large bore, big displacement engines.

The 350 h.p. and the 430 h.p. V8 engines are construction diesels from front to back, top to bottom. Every kind of application—every operating condition was considered in their design. The V8's represent the *most advanced* thinking in construction power on the market today! New features, major improvements combined with Cummins proven basic design makes them the most profitable source of power you can own or operate! And here's why...

CUMMINS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

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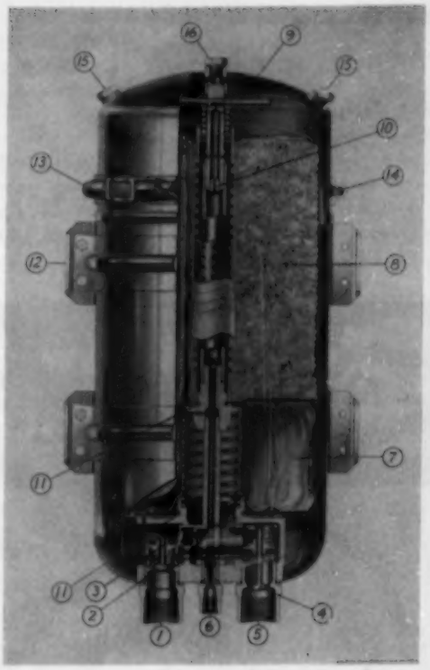
Litho in U.S.A. — MP-60

COMBINATION FULL-FLOW BY-PASS LUBE FILTER

DEVELOPMENT of a new lubricating oil filter has just been announced by Luber-finer Inc. This new filter called the Duleflow provides both full-flow and by-pass filtration of engine lube oil in one filter unit. The Duleflow filter is fitted with a single dual-circuit element which can be quickly and easily changed in one operation. The element screws down onto a large threaded shoulder in the bottom of the housing, and is held at the top by a spring-loaded hold-down assembly.

The filter element, known as the Dulepak, is made in two sections which are permanently fastened together providing two separate and independent filtering circuits within the one filter housing. The full-flow section of the element consists of a heavy weight cotton-twill fabric bag which filters the oil to approx. 45 microns. All of the oil flow passes through this section of the element before going to the engine bearings and other pressure-lubricated parts. The fabric bag handles a flow rate of 20-25 gpm of hot engine oil at a pressure-drop of approximately 5 psi. By-pass section consists of a regular Luber-finer Dieselpak. This section is orificed to take off about 10 percent of the full-flow stream and return it filtered to the oil pan.

The Duleflow filter is ruggedly constructed throughout, and has a number of interesting engineering features. The inlet and outlet fittings are located in the bottom of the filter housing, and are equipped with spring-loaded check valves to prevent the filter from draining out after shut-down. Filler plugs are provided in the top of the filter so the housing can easily be filled with oil after the filter has been serviced. Dual by-pass valves are provided to permit the full-flow oil stream to by-pass directly from the inlet to the outlet of the filter if this should ever become necessary due to excessive restriction or plugging of the full-flow filter bag. Normally, however, the filter operation never reaches the by-passing stage, because the by-pass valves are set to open at a pressure differential of 15 psi, whereas it is found that the pressure-drop or differential across the full-flow bag rarely exceeds 5 or 6 psi under normal conditions.



Cross section of the Luber-finer model 980 filter shows: 1. full-flow inlet (1" N.P.T.); 2. inlet check valve; 3. full-flow by-pass valve; 4. outlet check valve; 5. full-flow outlet (1" N.P.T.); 6. by-pass outlet (¼" N.P.T.); 7. full-flow element; 8. by-pass element; 9. spring-loaded element hold-down; 10. by-pass metering orifice; 11. O-ring pack seals; 12. heavy-duty mounting brackets; 13. single-bolt cover clamp; 14. O-ring cover gasket; 15. filler plugs; 16. vent plug.

The Duleflow filter is being produced initially in two sizes—models 980 and 1250. The model 980 is intended for use on diesel engines having crankcase oil capacities up to 5 gals; and the model 1250 up to approx. 8 gals. Both models are identical in design, except that the 1250 is somewhat taller and has a 50 per cent greater filtering capacity.

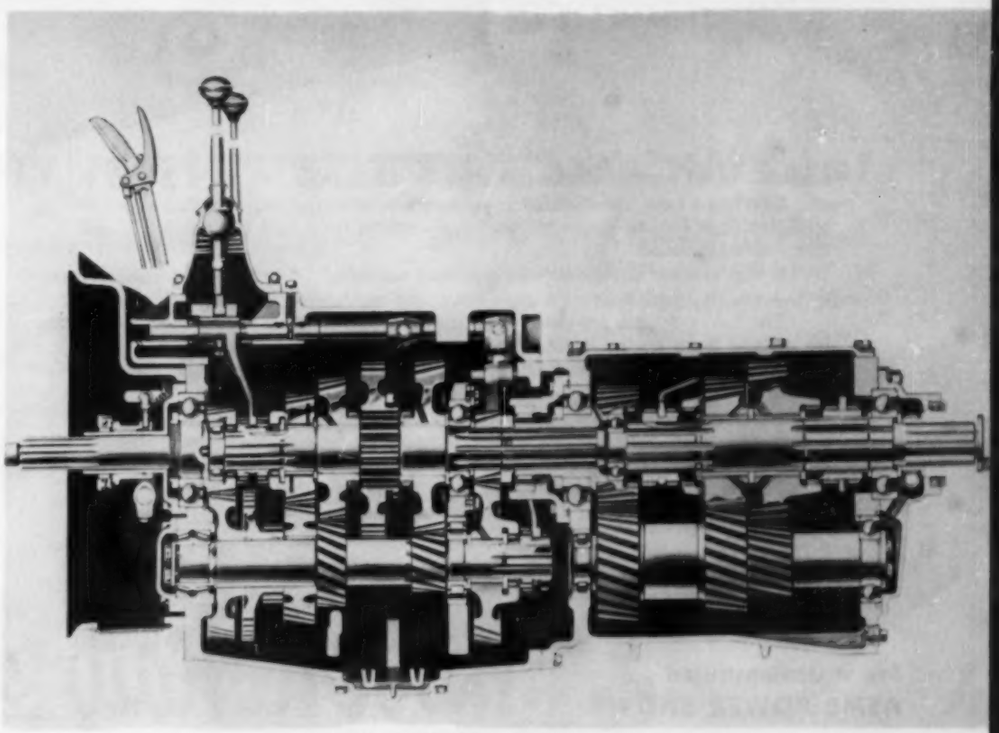
15-SPEED TRANSMISSION FOR HEAVY DUTY

TWO new heavy-duty 15-speed transmissions for heavy-duty truck service are being produced by Fuller Manufacturing Co. Designed for use in diesel trucks and tractors in the 1120 cu. in. class, the new transmissions, models 15-G-1120 and 15-H-1120, are designed especially for combination on and off-highway applications such as aggregates, ready-mix concrete, logging and construction.

Advantages claimed for the new transmissions include the following:

1. Extremely short installation dimension which will permit shorter wheelbase for tractors which formerly incorporated main and auxiliary transmissions;
2. Maximum operational flexibility with not only 10 closely-spaced gear splits, but also 5 speeds available for low range operation through a deep reduction in the auxiliary;
3. A wide choice of optional gear ratios;
4. Weight reduction obtained by elimination of support brackets, joints, cross members and a propeller shaft.

Differing only in the ratios of the deep reduction in the auxiliary section, the new Fuller transmissions are said to provide a selection of gears to handle any condition of load and terrain. The ratios of the 15-G-1120 vary from .64:1 in highest gear to 17.25:1 in the lowest gear in low range.



The new 15-speed Fuller Model 15-G-1120 Transmission

Mid-West Diesel News

By L. H. Houck

MORE Mercedes-Benz passenger cars with 4-cylinder diesel engines are being funneled into hands of individual owners rather than taxi fleets, according to Studebaker-Packard Corp., South Bend, Ind., in charge of U. S. sales. Demand is much greater than the supply, they reported, and as many individual owners as possible are to be supplied this year.

INLAND GM Diesel, Milwaukee, fabricated and delivered a 150 kw generator set with 6-110 GM diesel for use on an asphalt plant owned by the Puerto Rico Asphalt Co. They also purchased another 6-110 GM for use on a Cedarapids crusher.

ROSMANN Bros., Kenosha, Wis., bought a 3-71 GM diesel from Inland GM Diesel, for repowering a model 1020 Unit shovel.

MISSISSIPPI Valley Barge Lines, St. Louis, bought an International TD-6 with dozer from Missouri-Illinois Tractor & Equipment Co., Hazelwood, Mo.

SPEEDWAY Transports, Kenosha, Wis., had a 4-53 GM diesel installed in a F700 Ford truck by Inland GM Diesel, Inc.

JEFFERSON City Diesel, Inc., headed by A. J. Gates, has expanded its territory which now ranges to Arkansas on south, Iowa on north, Kansas City on west and St. Louis east. It features diesel equipped Case line, LeTourneau-Westinghouse and Adams graders.

OBSERVED: Clark Construction Co., job east of Clinton, Okla., Interstate 40, Caterpillar D9 with rock ripper, DW21 scrapers, International TD-24's push-loading.

INTERNATIONAL TD-9 with Drott to John Elkins, Maplewood, Mo., from Missouri-Illinois Tractor Co.

FOUR-in-One Drott equipment on an International TD-9 for E. J. Fischer & Co., St. Louis, Mo., from Missouri-Illinois Tractor Co.

GENERAL contractors, Ellison & Hoelscher, of Union, Mo., have added an International TD-9 with Drott loader to their equipment spread. Sale by Missouri-Illinois Tractor Co.

CONSTRUCTION firm, Riemer Bros., Inc., of Schiller Park, Ill., specializing in heavy construction, and building the new Ansco Corp., in Chicago, has added a 4-in-1 Drott clam-equipped International TD-6 to its fleet of seven Internationals.

BRINKER & Sons Landfill Inc., Berkeley, Mo., have added an International TD-15 with Drott 4-in-1 to its landfilling equipment. Sale by Missouri-Illinois Tractor Co.

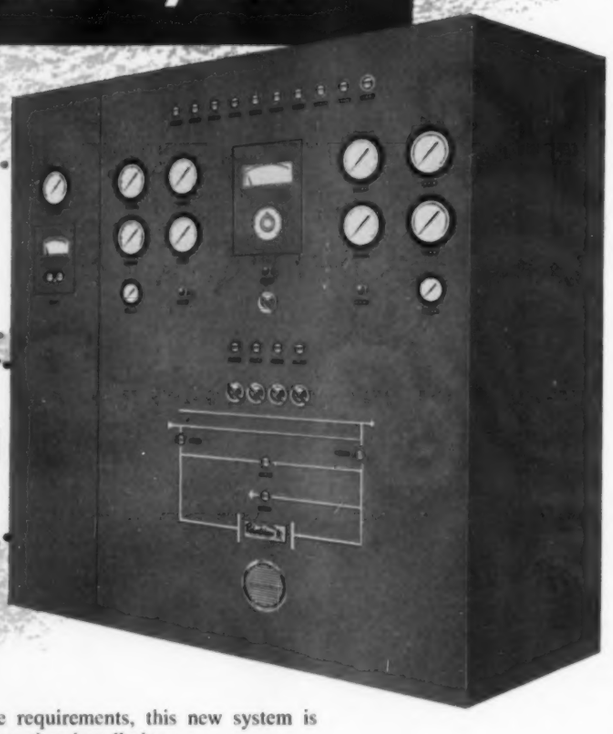
LACLEDE Steel Co., St. Louis, model 1055-LC P & H Crane, with Caterpillar diesel, from Missouri-Illinois Tractor Co.

HOUGH Payloader Model H90D, with Cummins diesel JN-6BI and Allison torque converter to Joerling Bros., Wentzville, Mo., from Missouri-Illinois Tractor Co.

HOUGH Payloader, Model H120, with Cummins 300 hp NRT-6BI diesel, Hough torque converter to Pittsburgh Plate Glass Co., Crystal City, Mo., from Missouri-Illinois Tractor Co.

HOUGH Payloader Model H90D, with Cummins JT-6BI diesel and Allison torque converter to Federal Materials Co., Cape Girardeau, Mo., from Missouri-Illinois Tractor Co.

Robertshaw Pneumatic Engine Control System



Automatic Warning or Shutdown Prevents Engine Damage

Start/Stop Functions Interlocked and Sequence-Controlled

Designed specifically for pipeline requirements, this new system is adaptable to all internal combustion engine installations.

Developed from standardized components—engineered and manufactured by Robertshaw for one-source responsibility—the system is fully pneumatic . . . and completely automatic.

It can monitor any number of measured variables of temperature, pressure, vibration, level, etc.; and instantly signals when any variable exceeds pre-set limits.

The Safety System prevents engine damage from malfunction or abnormal conditions by shutting down engine if condition is critical; if not, it signals a warning.

All start and stop operations are controlled in sequence and completely interlocked.

Every system is custom engineered to meet specific requirements, is tested as a complete system before shipment, and is backed by Robertshaw's world-wide engineering organization.

For further information, write for Bulletin JD-760. **Fulton Sylphon Division, Robertshaw-Fulton Controls Co., Knoxville 1, Tennessee**

See it demonstrated . . . ASME POWER SHOW

Robertshaw

MR. CONTROLS

GALION Model 104 motor grader with Cummins JT-6-BI diesel to the Butler County Court for road work, Poplar Bluff, Mo., from Mo.-Ill. Tractor Co.

GALION Model 450 motor grader with International UD-370 diesel to the Washington Special Road District, Washington, Mo., from Missouri-Illinois Tractor Co.

INTERNATIONAL TD-20 and 4-in-1 Drott to A. Seebold, Granite City, Ill., from Mo-Ill. Tractor Co.

G-E Reorganizes Group

General Electric has reorganized its apparatus and industrial group into two components—an industrial group and an electric utility group. Arthur F. Vinson, a vice president and formerly group executive of the apparatus and industrial group, will be group executive of the new industrial group. This group, which will address itself particularly to the component, materials and equipment needs of the industrial, contracting and transportation industries, will be comprised of the chemical and metallurgical division, component products division, motor and generator division and the apparatus sales division. Clarence H. Linder, a vice president and formerly in charge of engineering services, is group executive for the new electric utility group. This group comprises the switchgear and control division, transformer division and turbine division. The apparatus sales division, a pooled marketing organization, will provide services for the electric utility group, and will continue its services to the electronic, atomic and defense systems group. It also was announced that Hubert W. Gouldthorpe has been appointed general manager of the company's switchgear and control division, Philadelphia. Mr. Gouldthorpe succeeds Lewis J. Burger, who has been assigned to Fort Wayne, Ind., to head up a newly established laboratory operation for the component products division.

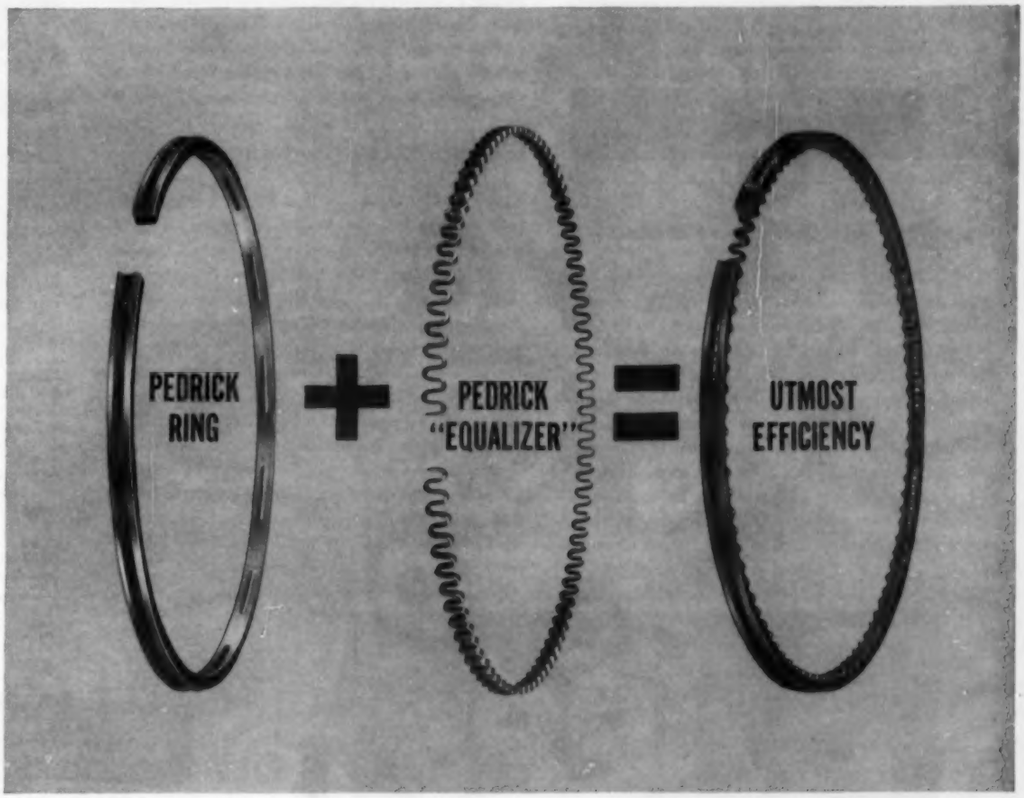
Honors Young Salesman

C. Louis Meyer, Chicago, has been honored as American Air Filter Co.'s outstanding young salesman for 1959. Meyer, who is affiliated with Air Filter and Equipment Co., Chicago, became the first recipient of the annual Robert W. Nelson Memorial Award established last year by members of his family in memory of the late AAF vice president who died in 1958. Eligible were personnel of AAF's field sales force who had not reached their 32nd birthday. Meyer was presented a replica of a permanent plaque for his permanent possession and shares of AAF Common Stock.

GM Diesel Distributor

GM Diesel has named Tri-State Engine Services, Inc., of Cincinnati, Ohio, as distributor of GM Diesel engines covering central and southwestern Ohio, Kentucky and central and southern Indiana. Tri-State is a new company formed to handle GM Diesel's line of automotive, industrial and marine models. The appointment is described as another move by GM Diesel to achieve 100 per cent distribution of its products through purely "engine houses". President and treasurer of the new company is Robert H. Grantham. Other officers include Harry W. Livengood, vice president and general manager: Frank R. Paprich and Walter I. Butler serve as managers of sales and general service and parts respectively. Harry H. Hoefer, Jr., is parts manager.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.



WHY IS THIS SO? For these reasons:

1. **Pedrick Formflex rings are radially thinner and thus more flexible than other rings. A reduction in radial thickness of as little as 20% *doubles* the ability to flex and *conform*.**
2. **The exclusive "Equalizer", which is a feature of Pedrick Formflex rings, delivers a tension which is absolutely uniform, correct and long lasting.**

Utmost efficiency in oil control, power delivery and fuel consumption is the result when you use Pedrick Formflex rings in complete cylinder sets, available for most popular engines. Engineering service available also for special problems. Phone or write WILKENING MANUFACTURING CO., Philadelphia 42, Pa. Saratoga 9-3770. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2

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PEDRICK PIONEERED CONFORMABLE RINGS FOR BIG-BORE ENGINES

for all wearing surfaces where
FREQUENT REPLACEMENT
is required

INSIST ON M-C-M
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Our customers tell us they have never seen a better job of Hard Chroming. We can prove it to you, too!

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Appointed Sales Promotion Manager

Carl Maass has been appointed to the post of sales promotion manager of Centrico, Inc., Englewood, N. J. Mr. Maass has long been engaged in marketing and advertising activities for Westfalia Centrifugal Separators. Mr. Maass has years of practical experience and educational background in marketing. Born in New York, he attended Columbia University, the University of Leipzig, the Latin-American Institute, and the American Institute of Banking, concentrating on economics, marketing and public relations courses. He has been connected with the Centrico organization in Englewood since 1952.

Division Sales Manager

James H. Bennett has been named division sales manager of the Walker Manufacturing Co.'s Original Equipment Sales Department. Mr. Bennett will direct sales to heavy duty motor truck industrial equipment, and off-the-highway vehicle manufacturers. He joined Walker in 1948 as Sales Engineer in the Original Equipment Division and, prior to his appointment, was engaged in original equipment sales to major car manufacturers. Miller F. Brown replaces Bennett as sales engineer. He was formerly employed as sales engineer with Automotive Rubber Co. of Detroit after serving in a similar position with the Worthington Corp. of Harrison, N.J.

Launch 3200 HP Towboat

The *Franklin Pierce*, a Dravo-3200 towboat, has been launched at the Neville Island shipyards of Dravo Corp., Pittsburgh. Purchased by Thomas Petroleum Transit, Inc., of Butler, Pa., the new vessel will operate between Gulf ports and Pittsburgh area terminals, pushing 16,000-ton cargos of gasoline, fuel oils, and solvents. The *Franklin Pierce* is the sixth 3200-horsepower towboat completed under Dravo's continuing stock building program. Like its sister boats, the *Franklin Pierce* features the Dravo precision-balanced propulsion system. The vessel is equipped with twin 1600 hp GM Cleveland diesel engines, Falk reverse reduction gears, Wichita clutch, Kort nozzles, stainless steel propellers, and hydraulic control of the six-rudder steering and flanking system.

SAVE MONEY WITH Interstate
diesel service incorporated
2093 East 19th St., Cleveland 15, Ohio

America's largest GM fuel injector rebuilder

Assumes Presidency of AED

Herbert J. Mayer of San Francisco, Calif., has been named president of the Associated Equipment Distributors. Mr. Mayer moves up from the post of senior vice president. His appointment followed the death on Feb. 19th of Jewel A. Benson, who less than a month earlier had taken the oath of office as the association's 41st President. The new head of AED is executive vice president of Western Machinery Co., and general manager of Edward R. Bacon Co., both in San Francisco, Calif.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

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PIONEERS IN MODERN OIL FILTRATION

THE TRADEMARK OF DEPENDABILITY AND EXPERIENCE IN DIESEL OPERATION FOR OVER A QUARTER OF A CENTURY . . . .

Diesel Fuel and Lube Oil Filters and Cartridges

THE BRIGGS FILTRATION CO.,
DEPT. 339, WASHINGTON 16, D. C.

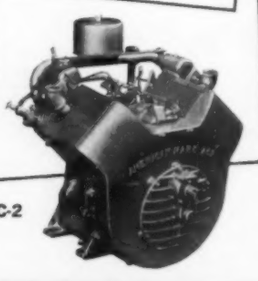
PRODUCT OF FLUIDYNE RESEARCH

AMERICAN MARC delivers the goods

American MARC Inc. brings the advantages of diesel power to manufacturers of equipment requiring 9 to 28 HP. They can now provide efficient diesel performance, longer engine life and assured economy to users requiring continuous dependable service. AMARC diesels are lightweight, too, due to utilization of new aluminum alloys which make them especially suitable for refrigerator cars and trucks, and portable generators.

For more specific information or application assistance write or call American MARC Inc., 1601 W. Florence Ave., Inglewood, Calif. ORegon 8-7174.

American MARC builds air and water cooled diesels from 9 to 28 HP; permanent magnet, static excited and brushless generators up to 100 KW; diesel-generator sets from 2½ to 10 KW, and the unique AMARC 10, the world's first diesel outboard engine.



model AC-2

AMERICAN MARC INC.
1601 West Florence Ave., Inglewood, Calif.

Gillett & Eaton Officer

R. W. Howard

R. W. Howard has been elected vice president of the Gillett & Eaton, Inc. by the board of directors. Howard's tenure with Gould-National Batteries, Inc. with whom Gillett & Eaton are affiliated, includes general staff assignments in Dallas, Texas and Salem, Oregon plants. Prior to joining the Twin Cities' organization he was associated with the Stewart-Warner Corp. and the Allison Division of General Motors, Indianapolis, with responsibilities of staff capacity.

Engine Sales Manager

H. R. McKnight

Harold R. McKnight has been appointed manager, truck engine sales, for General Motors Diesel Limited, London, Ontario. Mr. McKnight had been Manager, Sales Promotion and Advertising since November, 1956. He joined General Motors Diesel Limited in October, 1952 as District Manager in British Columbia and Yukon for G.M. Diesel Engine Sales.

New Sales Setup For Turbine Division

The Boeing Industrial Products Division, builders of the Boeing small gas turbine and high precision aircraft products, has combined all sales functions in a broadened marketing organization. William van Amerongen has been named acting director of marketing. He will report directly to Frank Korsberg, division manager. Korsberg said the reorganization combines market research, applications engineering, sales, service and spares to coordinate marketing efforts of Boeing gas turbines and other division products. Van Amerongen, who has been with Boeing 10 yrs., also will continue to head the division's contract administration section. Other changes in the company's sales organization include the appointment of William St. Germain as manager of military turbine sales; B. C. Karther, manager of commercial turbine sales; Douglas C. Cook, manager of European turbine sales; Daniel F. McGrath, service manager and Ralph Parr, spares manager, also will report to van Amerongen.

Wm. van Amerongen

Wm. St. Germain

D. C. Cook

B. C. Karther

Hercules Motors Names Two Vice Presidents

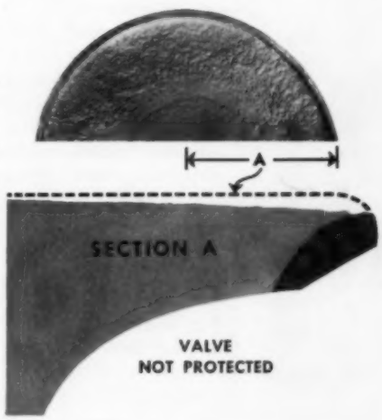
Lawrence G. Downey has been named vice president in charge of sales and George W. La Salle vice president in charge of engineering for Hercules Motors Corp. The appointments were announced by P. O. Peterson, president. Mr. Downey joined Hercules in 1940 and has worked in various executive sales capacities. Most recently, he has been responsible for west coast sales, with headquarters in Los Angeles. Mr. La Salle joined Hercules in 1928 and has been closely identified with its engineering and development activities. His most recent assignment has been as coordinator in the development of engines for use by the armed services and other governmental agencies.

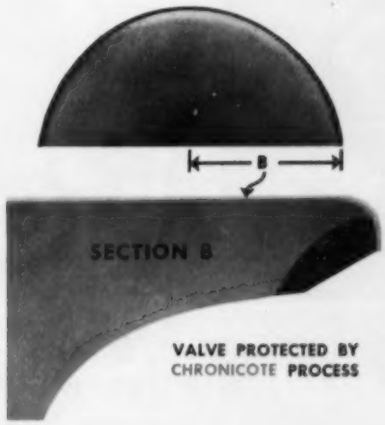
L. G. Downey

G. W. La Salle

CHRŌNICŌTE

A New Low-Cost Corrosion-Resistant Valve Head Coating that Eliminates Deposit-induced Preignition





CHRŌNICŌTE is a newly developed Eaton process of applying a chrome-nickel alloy to heavy-duty valve heads. At reasonable cost, it provides a degree of protection against preignition and corrosion heretofore accomplished only by means of much more costly methods.

We will be glad to furnish your engineers with technical reports covering life comparisons between CHRONICOTE and unprotected valves. We believe you will agree that Eaton CHRONICOTE Valves provide the long-sought solution to the problems of rapid corrosion and deposit-induced preignition. Write, wire or phone.

EATON

CHRŌNICŌTE
Means Extra Thousands of Trouble-Free Miles!

EATON VALVE DIVISION MANUFACTURING COMPANY
BATTLE CREEK, MICHIGAN

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Gears • Hydraulic Pumps Truck and Trailer Axles • Truck Transmissions • Permanent Mold Iron Castings • Automotive Heaters and Air Conditioners Fastening Devices • Cold Drawn Steel • Stampings • Forgings • Leaf and Coil Springs • Dynamatic Drives and Brakes Powdered Metal Parts • Variable Speed Drives • Speed Reducers • Differentials • Centralized Lubrication Systems

Inland River Reports

By A. D. Burroughs

TWO Superior engines provide the propulsion power for the new 118 ft. towboat, *John H. Elliott*. The 1066 hp craft, owned by U.S. Steel and built by Hillman Barge and Construction Co., will see action in the Ohio coal trade.

A twin-screw utility boat, under construction at Humboldt Boat Service, St. Louis, will join the fleet operation for owner Missouri Soybean Co., Caruthersville, Mo. Scheduled power rating is reported as 330 hp.

R. J. Brown Towing Co., Pittsburgh, long-time operators of the *Philo*, have two new towboats in operation. *Dickie*, the new 41.8x13.4 ft. craft has Hercules push-power. Second craft the *Edwin L.* formerly the *Mark I*, has been purchased from J. A. Jones Construction Co., N.C.

THREE GM (Detroit) Model 6-71-E engines have been installed on the new towboat delivered by Humboldt Boat Service to C. D. Richards and Son, Inc., Pomeroy, Ohio. The 57x22 ft. craft has a rated 510 hp.

BREAUX'S Bay Craft, Inc., Loreauville, La., delivered a new 38x13.5 ft. towing craft to R. A. Rodriguez and J. W. Sutton. Named the *Bayou Bengal*, power comes from two GM (Detroit) engines rated at 235 hp each at 1800 rpm.

THE *Jackie D.*, identical craft to the *Bayou Bengal* complete with GM engines, was completed by the Breaux shipyard for operation by the Dazet Boat Rental, La.

TWO GM (Detroit) V-8 engines supply the 616 hp for the new *Miss Laura*, another recent production from the Breaux yards. The 35.9x12.1 ft. oil exploration craft will work for the John A. Adema Boat Rental.

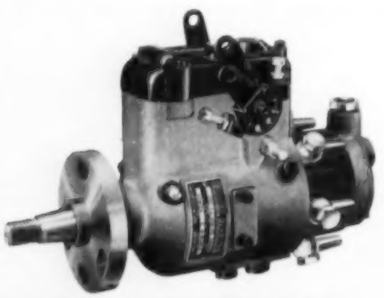
W. P. Sturart placed into operation another new oil exploration craft from the Breaux yards. Named the *Golden Streak*, the 38.2x12.5 ft. vessel receives a rated 570 hp from the pair of GM 6-71's supplied by George Engine Co., Harvey, La.

SIGHTED on the Mississippi was the big YTB 752, the first of two identical 108x28 ft. tugs to be delivered by builder Christy Corp., Sturgeon Bay, Wis., to the U.S. Navy. The Alco model 251B main engine develops 1800 bhp at 1000 rpm.

THE *William B. Barnett II* was spotted making good time on the Ohio with 1300 hp developed from two Caterpillar engines. This 75x24 ft. towboat was a 1958 production from Greenville Barge Co., for American River Lines.

THE *Etta Kelce* was spotted with a coal run from Green River to Lawrenceburg, Ind., with 1200 hp delivered from twin Fairbanks-Morse OP engines. The 90 ft. towboat, operated by Mid-America Transportation Co., St. Louis, was completed in 1958 by St. Louis Ship.

THE Sioux City, Iowa, firm, Western Contracting Corp., completed conversion work on their towing vessel, *Commanche*. The converted U.S. Navy LCM will perform on the Pacific coast, with power supplied by General Motors 6-71 engines.



ROOSA MASTER

Most Versatile

FUEL INJECTION PUMP

Diesel engine manufacturers, their designers and engineers are specifying ROOSA MASTER because they know that it is the most versatile. There are many reasons for selecting this pump. Here are just a few:

- VERSATILE because of the variety of built-in, space saving, accessories demanded by modern diesel engine design. Roosa Master can provide more compact, lower cost, complete units to meet many different applications.
- VERSATILE because only one size pump serves either a 2, 3, 4, 6, or 8 cylinder, 2 or 4 cycle, small or large displacement engine . . . and only Roosa Master can be mounted vertically or horizontally.
- VERSATILE because it is applicable to automotive, construction, farm, generator, marine and stationary equipment guaranteeing dependable, economical service. Write for further information.

HMS ROOSA MASTER makes good diesels better

HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.

DIVISION OF STANDARD SCREW COMPANY

New Vee-Type Gas Engine

New illustrated bulletin 176, just issued by Clark Bros. Co., introduces the model TPV, a 2-Cycle, Vee-type, turbocharged gas engine designed as a compact, high horsepower driver for centrifugal pipeline compressors, generators and liquid pumps. Described and illustrated are the design and operating features which result from joining 2-cycle simplicity and dependability with Vee-engine compactness. The TPV is said to have minimum number of wearing parts, maximum horsepower-to-space ratio, 110 bmep, and low fuel consumption. Other advantages claimed include wide safe operating range, ample reserve capacity for temporary overloads and an unusually low maintenance factor. Construction incorporates a rigid, one-piece cylinder block, heavily ribbed crankcase, huge computer-designed crankshaft, removable power cylinder liners, and an automatic, jet air started turbocharger. Models are built with 10, 12, and 16 power cylinders, rated at 4000, 4800 and 6400 bhp respectively. Copies of Bulletin 176 can be obtained by writing to Clark Bros. Co., Olean, N.Y. (ITS NEW)

SNAME Committees Picked

Rear Admiral Albert G. Mumma, USN (Ret.), president of The Society of Naval Architects and Marine Engineers, and vice-president-engineering, Worthington Corp., has announced the appointment of new committees for the year 1960. These many committees are required in order to carry on the varied activities of the Society throughout the United States, Canada and the Hawaiian Islands. With a record total membership of over 7,500 and the considerable number of technical sessions being conducted throughout each year by the regional sections established in twelve widely separated areas, these working committees are important to the proper functioning and advancement of the affairs and particularly the technical research of the society. The committees and their newly appointed chairmen are as follows: The technical and research committees will be guided by a steering committee under the chairmanship of Edwin L. Stewart, former special assistant to president, Esso Tankers, Inc., and now retired, with Donald A. Holden as deputy chairman. Mr. Holden is executive vice-president, Newport News Shipbuilding and Dry Dock Co. The four specialized research committees are: hydrodynamics under John B. Parkinson, technical consultant, Langley research center, National Aeronautics and Space Administration, Langley Field, Va. Hull Structure under Professor J. Harvey Evans, Massachusetts Institute of Technology. Ships' Machinery under Harold J. Chase, manager, engineering, small steam turbine department, General Electric Co., Fitchburg, Mass. Ship Technical Operations under Nicholas Bachko, assistant superintendent engineer, United States Lines, New York, N. Y. The society's technical and research committees perform an important part in the coordination and processing of a large volume of constant research in the fields of shipbuilding and ship operation, and allied trades, and in fostering related research projects.

Regional Manager

Appointment of F. B. Steele as Chicago Regional Manager has been announced by the Industrial Division of Gould-National Batteries, Inc., Trenton, N.J. Steele has been Chicago District Manager since early 1957.

District Sales Manager

John E. Dooley has been appointed district manager by Dayton Industrial Products Co. division of Dayton Rubber Co., to handle the company's line of automotive V-belts, heater hose, radiator hose and related items in New York State and Vermont. He will work out of Syracuse, N.Y.

Fuel Water Separator

A new product is said to remove water from petroleum fuel used in tractors, trucks, locomotives, ships and other heavy equipment. The Fuel/Water Separator is made by Harco Manufacturing Co. and is made in various sizes. They are designed to protect engines from the water present in petroleum fuels which can shorten engine life. A conicle baffle causes a detour for the fuel forcing the mixture of fuel and water to a point immediately above the water trap. Natural settling of the heavier-than-oil water then takes place and it is prevented from flowing on to the engine. A mounting bracket is provided. The maker says the unit will operate efficiently even when it is half full of water. For information write Harco Manufacturing Co., Portland, Ore. (ITS NEW)

New Onan Distributor

Onan Eastern Corp., Long Island City, New York, has been named distributors for Onan products for New York City trading area, Connecticut and northern New Jersey counties. Onan Eastern Corp. is a new, independently owned and operated corporation headed by: Ralph Siegel, president; Martin Taylor, vice president and sales manager and Leonard Freeman, assistant secretary and sales engineer. All three men were previously associated with John Reiner & Co., Long Island City, distributor for D. W. Onan and Sons, for the area since 1945.

Michigan-Ohio News

By Jim Brown

PENINSULAR Diesel Inc. of Detroit reports sale of a 250 kw generator set with a GM model 12205 diesel engine. The set was purchased by Wayne County General Hospital.

EARLE Equipment Co. of Detroit sold an Allis-Chalmers model HD 21G crawler with a 4 cu. yd. bucket to Great Lakes Steel Corp. of Ecorse, Michigan. The new loader will be used around the blast furnaces at Great Lakes Steel. It is rated at 256 hp and weighs 66,500 lbs.

FRANK Strausberg of Chesaning, Mich. has accepted delivery on a Diamond model 70 gravel plant powered by a GM 6-71 diesel engine. Local distributor of Diamond Iron Works is Miller Equipment Co. of Livonia, Mich.

VERNON Slack of Novi, Michigan has installed a 7067-5240 GM diesel engine in his 1957 Ford F-800. The new diesel replaces a gasoline engine, and was installed by Peninsular Diesel Inc.

FRANK J. Knight Co. of Centerline, Mich. has accepted delivery on an International model TD-9 crawler with Drott 4-in-1 attachment. Sale was made by Wolverine Tractor &. Equipment Co. of Detroit.

A NEW Allis-Chalmers model HD6E with 6BE hydraulic dozer blade was recently delivered to William Velting & Son of Grand Rapids, Mich. Sale was by Earle Equipment Co.

CUMMINS Diesel Michigan Inc. of Dearborn recently installed a Cummins JT 175-B in an International ACO-195 truck. The installation was done for Yellow Transit of Detroit.

PENINSULAR Diesel Inc. installed a GM 3057-C diesel engine in a Michigan model 125A 1½-yd. loader. The installation was made for Mid-America Engineering Co. of Muskegon, Mich.

QUARRY Operators, Inc. of Dundee, Mich. has accepted delivery on an Allis-Chalmers model TL-16DA Tracto-Loader with a 2 cu. yd. bucket. Sale was made by Earle Equipment Co.

PENINSULAR Diesel Inc. recently installed a GM 4171E in a Reo A-603 for Frank Thomason of Detroit.

JIM Burke of Jackson, Michigan has accepted delivery on an International TD-9 crawler with hydraulic bulldozer blade. Sale was made by the Detroit office of Wolverine Tractor & Equipment Co.

HERB Jones of Charlotte, Mich. has accepted delivery on an Allis-Chalmers model HD6E crawler equipped with a 6BE hydraulic dozer blade. Sale was made by Earle Equipment Co.

McCLURE Drilling Co. of Mt. Pleasant, Michigan has had a GM model 62406 RD diesel engine installed on their Gardner-Denver mud pump. Installation was done by Peninsular Diesel Inc.

AN Allis-Chalmers model HD 21A diesel tractor equipped with a 21HS hydaulic bulldozer blade was recently sold to Quarry Operators, Inc. of Dundee, Michigan. Sale was made by Earle Equipment Co.

MARION Wilhoit, a broker from Lincoln Park, Mich. has accepted delivery on a Cummins NH-250B diesel engine. The NH-250B is a new model in the Cummins line of engines. It is naturally aspirated, has an 855 cu. in. displacement, maximum torque of 685 ft./lbs. at 1500 rpm and a maximum speed of 2100 rpm.

GREAT Lakes Steel Corp. of Ecorse, Mich. has accepted delivery on an Allis-Chalmers model HD6G diesel tractor with a heavy duty 1½-yd. rock bucket. Sale was made by Earle Equipment Co.

ANDERSON Construction Equipment Co., Southfield, Mich., sold a Grove model 68 crane with a Hercules DD 226 diesel to Great Lakes Steel Corp., Ecorse, Mich.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks,, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

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Ellicott Begins 75th Year

With the start of 1960 the Ellicott Machine Corp., Baltimore, began its 75th year of designing and manufacturing dredges and dredging equipment. Founded in 1885 as a small general repair shop in Baltimore by Charles Ellis Ellicott, the business moved after 10 years to Clinton St. where it remained until destroyed by fire in 1899. It then was housed in a small frame plant in a corner of an area incorporated into the plant now occupying an entire city block. The founder headed the company until his death in 1942 when his son, C. Ellis Ellicott, Jr., succeeded him. In 1957, the latter became chairman of the board and Allan W. Mund, formerly vice-president, was named president.

Highlights of the company's contributions to the field of dredging include the designing and building of high-speed triple-expansion steam engines for dredge service, beginning in 1904, and pioneering in the use of the diesel engine as dredge motive power, either as a direct drive or a diesel-electric combination, in 1922. Today its engineers are fully experienced in the design and construction of all types of mechanically and hydraulically operated dredges and the line of floating excavators includes dipper, grapple and bucket-line units plus sea-going hopper dredge machinery and a varied group of hydraulic pipeline cutterhead dredges ranging in sizes from 36 in. to 6 in. including a standard line of portable dredges trademarked the "Dragons". Ellicott machines have been employed on many notable construction projects, including the Panama Canal, for which the company furnished the hydraulic pipeline dredges used in the original construction and subsequent maintenance, the St. Lawrence Seaway, the Steep Rock Lake project in Canada and many major land improvement and waterway programs. In 1953, as part of a long-range program for the expansion and diversification of Ellicott products, the company acquired Ellicott Fabricators Inc., Baltimore, (formerly known as Novelty Steam Boiler Works). In 1955, a majority-owned subsidiary, Dragues Ellicott France, S.A.R.L., with headquarters in Paris, was established. This subsidiary acts in a sales and engineering capacity for business in Western European countries and their overseas territories. Later foreign branches have been set up in Mexico and Brazil and in addition Ellicott maintains a network of sales and engineering representatives throughout the world. To increase its services in the dredging field, in 1957 Ellicott took over the floating dredge businesses of the Bucyrus-Erie Co. and the American Steel Dredge Division of the American Hoist and Derrick Co. That same year, Ellicott acquired the McConway & Torley Corporation, Pittsburgh, engaged in the production of steel castings, including automatic couplers for railroad cars, other railway specialties, and electric carbon and allied steel castings for general industry. The most recent growth was announced on December 31, when Ellicott joined with Timberland Machines, Ltd. of Woodstock, Ontario, Canada, to form a new Canadian company named Timberland-Ellicott, Ltd. The concern will manufacture in Canada the line of Ellicott dredges and derdging machinery. These products will be built not only for the Canadian market, but for export to overseas purchasers located in sterling area countries and other foreign nations where markets for Canadian products are already established.

New Pilot Relief Valve

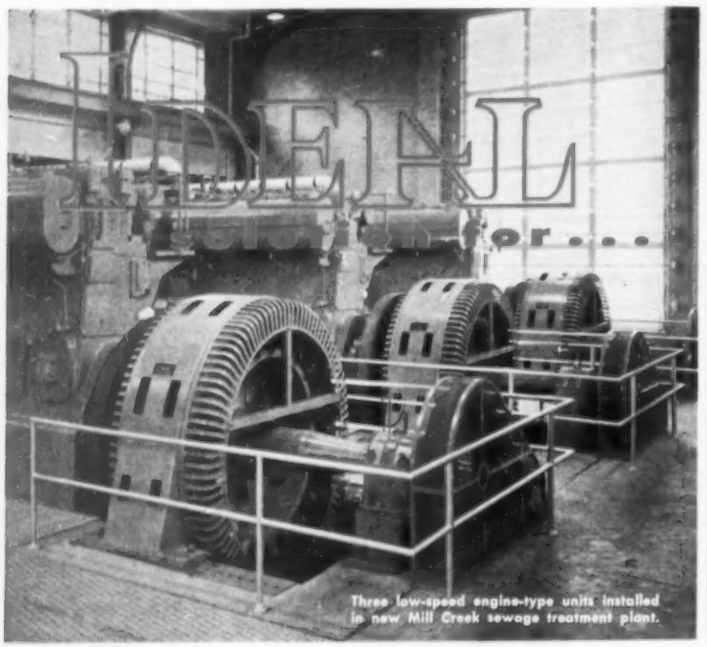
A new pilot operated relief valve is said to be suitable for use in hydraulic systems that must operate in remote places where there may be difficulties in trying to follow a frequent or regular maintenance routine. Capacity of the Parker "Hydrelief," designated model number VPR3P3F, is 30 gpm in offset mounting and 20 gpm when mounted in-line. Pressure adjustment range is from 250 psi to 3000 psi. Pressure rise between cracking or opening of the relief to full flow at the maximum rated capacity and pressure is 6 per cent. Additional information on the "Hydrelief" is offered in catalog sheet 1561A11, available from Parker Hydraulics Division, Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio. ITS NEW

Robertshaw-Fulton Buys Acragage Instrument Firm

The Acragage instrument business of International Register Co., Chicago, has been purchased by Robertshaw-Fulton Controls Co. T. T. Arden, Robertshaw president, announced. Chief products in the Acragage line are commercial indicating pressure and vacuum gauges. The gauges feature solid front design and utilize the Bourdon tube principle. They now are sold mainly to the petroleum, chemical and petrochemical industries, and to original equipment manufactures, utilities and process control industries. Annual sales of the line have been at the rate of about $400,000, Arden said. The purchase includes inventory, machinery, equipment and patents. Robertshaw will manufacture the products at its Fulton Sylphon Division, Knoxville, Tenn.

Electro-Motive Promotion

Appointment of Harry E. Schneider as superintendent of the engine division at Electro-Motive Division of General Motors is announced by William H. Harvey, director of production for Electro-Motive. Mr. Schneider, who has been plant manager of the company's Plant Two in Chicago will be in charge of all engine production for EMD. He succeeds Arthur A. Montes, who has been named general superintendent for Plant Two. At the same time, Harvey announced two additional manufacturing appointments: John L. Wagner, former assistant superintendent of the locomotive division in charge of locomotive rebuild, to superintendent of a newly created rebuild manufacturing department at LaGrange; and Verne L. Brandes, former assistant superintendent of the locomotive division, to superintendent of the locomotive division succeeding the late William A. Schweinberg.



Three low-speed engine-type units installed in new Mill Creek sewage treatment plant.

ideal performance

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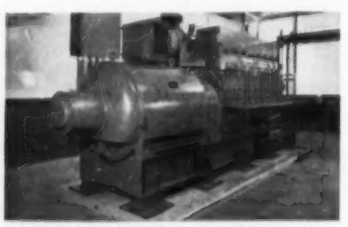
Low and high-speed types in ratings from 10 to 10,000 KW, with switchgear and controls for all applications. Extra emphasis on rugged construction, with a wide selection of insulations and a patented bearing design for simple, easy replacement.


EMERGENCY STANDBY—Typical high-speed unit installed on a diesel generating set in a Midwestern metropolitan telephone exchange.

Write for Bulletins 505 and 510

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326 East First Street Mansfield, Ohio

SINCE 1903, AMERICA'S FINEST MOTORS, GENERATORS, MOTOR-GENERATOR SETS, SWITCHGEAR AND CONTROLS

Develops New "CX" V-Belt

Raybestos-Manhattan, Inc., has announced development of a fully molded, fully jacketed notched V-belt. Primary advantages claimed for this entirely new belt, called the "CX" V-belt are quiet, vibrationless running characteristics, ruggedness and greater flexibility, permitting it to run smoothly over smaller pulleys. In addition, the fully molded and fully jacketed construction is said to eliminate flex-cracking, and increase fatigue resistance. The firm, fully fabric covered body is also said to resist cross-sectional distortion, maintains lateral stability, and resist changes in effective length. At present, the new notched "CX" V-belt is available only to original equipment manufacturers. Inquiries should be addressed to Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N.J. (ITS NEW)

International-Harvester Plans To Buy Fort Wayne Plant

International Harvester Co. plans to purchase from United States Rubber Co. a factory in Fort Wayne, Indiana, having more than 500,000 sq. ft. of floor space and a site of approximately 60 acres. This was announced by Ralph M. Buzard, vice president of the Motor Truck Division of Harvester. The price was not disclosed. Acquisition of the former U.S. Rubber plant will increase Harvester's plant area in Fort Wayne by approximately 25 percent. Harvester's present Fort Wayne Works, which manufactures International heavy-duty motor trucks, has approximately 2-million sq. ft. of floor space. "As a near-term utilization of the plant, our present plans call for development there of specialized assembly of heavy-duty trucks and it is quite possible that some of the space may be used for manufacture of components," Buzard said. "Naturally, until our plans are crystallized, it is not possible for us to estimate the effect of this acquisition on our employment in Fort Wayne or to state a definite time when operations will begin in the new facility. Eventually, this certainly should result in an increased number of jobs in our Fort Wayne Works." Buzard said details of occupying the new facility will be worked out with U.S. Rubber but had not yet been completed.

Engine Life Folder

A new, six page folder by Caterpillar Tractor Co. outlines steps that can be taken to minimize engine downtime and stresses the importance of using manufacturers' parts in order to be assured of maximum service life. Among the reconditioning tips included in the booklet are points covering installation of cylinder liners, valve guides, piston rings, piston pins, and pistons. Copies of "Some Facts of Engine Life" are available by writing for form DE918, Advertising Division, Caterpillar Tractor Co., Peoria, Ill. (ITS NEW)

Worthington Will Supply Missile Base Equipment

Worthington Corp. is supplying five major categories of shock-proofed mechanical equipment for the first operational Titan ICBM bases now being built near Denver, Colo. The firm has been awarded Air Force contracts totalling $5-million for air conditioning, diesel engines, generators, compressors and a wide range of instrumentation equipment. The Titan bases, Squadrons I and II, which will cost $67,000,000 are under construction on the Lowry Air Force Base bombing range outside Denver. Completely underground, with reinforced concrete walls ranging from one to ten feet thick and utilizing shock resistant equipment throughout, the two squadrons will provide six entirely self sufficient missile launching sites. It would take a direct hit by a nuclear warhead to knock out the ability of any one of the Titans to strike back in case of enemy attack, according to experts. The missiles themselves will be stored and fired from silos extending underground 165 ft., or approximately 15 stories. Each squadron consists of three launching pads together with underground chambers for equipment and personnel. Each pad will have its own powerhouse containing four diesel engines driving 1000 kw generators and two 300-ton air conditioning units. Compressors for shop and instrument air will be located in equipment terminal buildings. Worthington's principal contract called for 24 diesel engines and generators, 12 chillers and 18 compressors together with auxiliary pumps and other equipment.

9,000th Small Turbine Produced

Production of its 9,000th small gas turbine engine has been announced by the AiResearch Manufacturing division, The Garrett Corp., Phoenix, Ariz. AiResearch developed its first turbine in 1947 for the U. S. Navy P5Y flying boat. Today over 1500 of the firm's turbines are in Navy service. Largest user of AiResearch turbines is the U. S. Air Force. The baby jets are mounted in carts, on tractors, or in such craft as the C-130 and C-133 transports, or KC-135 jet tankers as airborne auxiliary power units. Other AiResearch turbines power missile systems such as the Army's Sergeant, and provide main propulsion for helicopters. Airborne turbines also serve in the Grumman Gulfstream and other business aircraft. To date 204 AiResearch turbines are in use by foreign and domestic commercial airlines.

AWO Survey Shows 317 Plants Built, Planned

Industry last year constructed or announced plans to develop 317 new plants and other facilities along the navigable inland waterways, according to a survey just completed by The American Waterways Operators, Inc. Of last year's total of 317 waterside projects, 161 installations, or 51 percent, were terminals, docks, wharves and other facilities designed especially for handling barge commerce, Braxton B. Carr, president of the nationwide shallow-draft water carrier trade association, said in announcing the survey's results. This is the largest number of such terminal facilities erected in one year since AWO started keeping waterside plant statistics in 1952. The total of 317 new waterside plants planned or erected last year was 35 percent below the 488 developed by industry in 1958—the second best year on record since AWO began the survey in 1952. Last year's decline is attributed in part to a 25 percent drop in total industrial construction. The best year on record was 1956 when 565 waterside plants were constructed or expanded. Since The American Waterways Operators, Inc., began this survey eight years ago, a total of 3,209 new plants of all types have been built on the navigable waterways. A geographical breakdown of the 1959 survey shows that industry in the mid-continent area and the South last year ran far ahead of the other portions of the nation in constructing new or expanding existing plant facilities on navigable waterways. These two areas accounted for 247 projects, or 75 percent of all reported in the AWO survey. The fourth quarter results of the AWO waterside plant site survey reveal that there were 79 new industrial facilities constructed or expanded during October, November and December, almost as many as were built during the same period of 1958.

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Self-Contained Commercial Jet

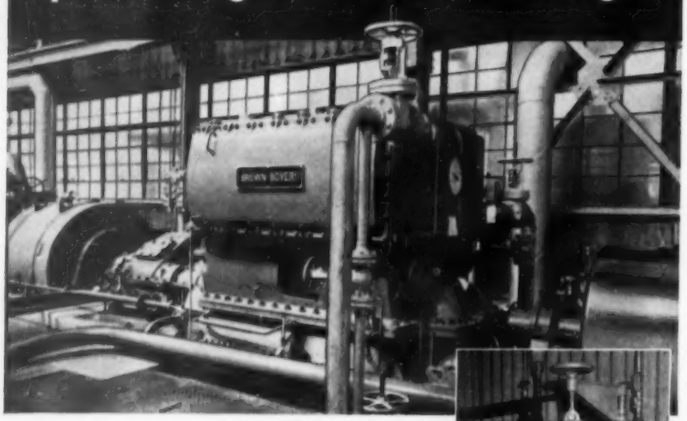
Said to be the first self-contained commercial aircraft ever built will be a twin-jet Mark VII Caravelle. The French built jet liner will carry its own ground power provided by an on-board AiResearch small gas turbine. Delivery this summer will introduce the Mark VII version of the French jet, designed for the American and world commercial markets. Sud Aviation has already sold 61 earlier Caravelle versions to major foreign commercial carriers. Air France and SAS have purchased 42 between them, the remaining 19 going to Alitalia, Verig, Sabena, and Finnair. The Mark VII will feature an increased cruising speed (540 mph) and a 500 mile range increase to 2,000 miles. Due to its on-board turbine it will also be the first commercial jet capable of operation independent of ground starting and power equipment. The Caravelle small gas turbine is a nearly identical unit to the AiResearch cart and truck mounted turbines now in use providing ground starting for many major United States and foreign airlines. In the demonstrator Caravelle the AiResearch turbine will be mounted in the forward baggage compartment. AiResearch and Sud Aviation are now negotiating to offer Mark VII and VIII versions with AiResearch turbines mounted in the unique aft-turbine craft's tail cone.

Perfect Circle Sales Gain

Perfect Circle Corp. showed a 30 percent gain in sales and an earnings increase of 80 percent to attain new record levels in 1959, the company's 65th year. Don H. Teetor, chairman of the board, and W. B. Prosser, president, in their annual report to shareholders said net sales amounted to $40,135,063, compared with $30,790,484 in 1958. Earnings totalled $3,898,175, or $3.37 a share, as compared with $2,163,477, or $1.87 a share for 1958.

NUGENT FILTER

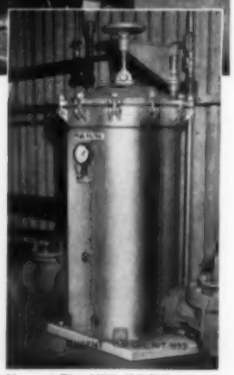
protects gas turbine bearings



Recharges changed just once a year

One Nugent Filter, Fig. 1555-4L7 handles all the lubricating oil for this 3000 HP Brown Boveri Gas Turbine. Continuous full-flow filtering removes harmful impurities before they can form sludge or acidity. Foreign particles 5 microns and smaller are trapped. Recharges are changed only once a year, due to extended capacity.

Need a single filter or a complete system . . . contact Nugent, today.



Nugent Fig. 1555-4L7 Filter uses laminated disc recharges.

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OILING AND FILTERING SYSTEMS • OILING DEVICES
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Tractor Works 50 Years Old

International Harvester Co.'s Tractor Works at Chicago is celebrating its 50th anniversary of tractor production—a half-century that has seen the manufacture of more than one million product items that have included crawler and wheel tractors, power units and bullgrader and bulldozer blades. Tractor Works had a small beginning, in 1910, with the building of 17 huge, friction-drive wheel tractors. These were fabricated partly in a tent and partly in a barn with the help of 196 employes. Today, the Tractor Works consists of 33 buildings extending over an 82-acre tract and containing 1,750,000 sq. ft. of floor space. Normal employment is 5,000 persons. One of the oldest International Harvester's 19 U. S. manufacturing facilities, Tractor Works now is turning out four basic models of crawler tractors. All models have diesel engines, with the exception of the gas-powered engine furnished for the T-6 unit. Tractor Works is one of the most-visited of IH plants, annually playing host to 5,000 persons from all corners of the globe.

Allis-Chalmers Promotions

Regional and district managers in the Industries Group and a marketing manager for the Industrial Equipment Division have been named by the Allis-Chalmers Manufacturing Co. In the Industries Group, Charles F. O'Riordan will be manager of the North Central region, Robert E. Morris is the new manager of the Midwest region, J. A. Sudduth will head the St. Louis district and W. S. Wright will head the Grand Rapids district. M. M. York will move up from manager of the North Central region to manager of marketing for the Industrial Equipment Division. York has been with Allis-Chalmers since 1939 and was appointed to the regional managership in 1954. Mr. O'Riordan joined the firm in 1935 and before his new appointment was manager of the Midwest region. Mr. Morris, formely manager of the St. Louis district, joined Allis-Chalmers in 1940 while Mr. Sudduth, an employee since 1948, was formerly manager of the Grand Rapids district. Mr. Wright moves to his new position from his former post as a sales representative in the Grand Rapids office. He has been with the firm since 1952.

New Malfunction Monitor

A malfunction monitor designed to detect excessive vibration in rotating and reciprocating machinery is available in a new version using pneumatic lines for control power. A new version of the Vibraswitch, previously manufactured only in electrical control models, is intended for applications where electric control power is unavailable or undesirable, where pneumatic pressure is plentiful, and in instances where pressure-loss sensing devices are already in use on pneumatic lines. Model 67 Vibraswitch operates by opening a bypass valve in a pneumatic line and exhausting the line pressure to atmosphere. The design permits detection of vibration caused by a malfunction and enables immediate actuation to prevent extensive damage to the monitored equipment. The product is said to respond to high frequency, low-level vibration and to provide significant warning of bearing failure, broken piston rings or other incipient damage. A bulletin may be obtained from the manufacturer, Aeronautical and Instrument Division, Robertshaw-Fulton Controls Co., Santa Ana Freeway at Euclid Ave., Anaheim, Calif. (ITS NEW)

Corrosion Inhibitor Bulletin

A corrosion inhibitor developed to protect low make-up closed cooling and heating systems, is the subject of new six-page bulletin. Compatible with solutions of alcohol and glycol-base antifreezes, Corrosion Inhibitor CS is said to control corrosion by producing a protective film on exposed metal surfaces, including iron, steel, copper, copper alloys, aluminum, brass and solder. In addition to information on the preparation of feed solutions and tests for determination of proper concentrations, the new bulletin contains seven case histories of the product in use. For copies of bulletin HSP-922, write Hagan Chemicals & Controls, Inc., Hagan Building, Box 1346, Pittsburgh 30, Pa.

(ITS NEW)

New Service, Parts Office

A new service office and parts warehouse has been opened by the Cleveland Diesel Engine Division, General Motors Corp., at 1610 Paterson Plank Road, North Bergen, New Jersey. This office replaces the service and parts warehouse formerly located at 304 East 45th Street, New York City. John W. Christiansen, East Coast Service Manager, continues in charge. His assistant is W. E. Newton. The new, air conditioned building of masonry construction has more than 9,000 sq. ft. of floor space. Of this space 7,000 sq. ft. is parts warehouse. An inventory sufficient to meet requirements for GM replacement parts in the East Coast area is carried in stock.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

Allison General Manager Elected GM Vice-President

Harold H. Dice, general manager of the Allison Division was elected vice-president of General Motors Corp. by GM's Board of Directors meeting in New York City. A veteran of more than 30 years service with General Motors, Dice was Allison assistant general manager for seven years preceding his promotion to general manager. He succeeds E. B. Newill, 65, who retired March 1 after 17 years as Allison general manager and a career with GM dating back to 1929. Mr. Newill was elected vice president in 1948. Mr. Dice, a native of Veedersburg, Ind., and a 1929 graduate of the University of Illinois, joined GM in 1929 in the production control department of Delco-Remy Division's battery operations at Muncie, Ind. He served briefly as assistant chief inspector for Delco-Remy in 1946, and then went to Electro-Motive Division in LaGrange, Ill., as director of test and inspection. Mr. Dice was administrative assistant to the general manager of Electro-Motive from 1950 to 1953, when he moved to Allison.

Hemisphere Oilfield Representative

J. B. (Ben) West has been appointed manager,—Western Hemisphere oilfield sales for Cummins Diesel International Ltd., it has been announced by Reece Hatchitt, director—International Operations for Cummins Engine Company, Inc. Mr. West will represent Cummins in Latin America and Mexico, specializing in sales of diesel engines to the oil, gas and petrochemical industries. He will reside in Sao Paulo, Brazil. Before joining Cummins Diesel International Ltd., West was associated with U. S. Steel International Ltd., and the Oil Well Supply Division of United States Steel Corp.

Western Gear Promotions

Several promotions in the Industrial Products Division of Western Gear Corp., have been announced by Edward W. Jenks, marketing manager. Howard J. Feichtmann has been promoted to sales manager of the Los Angeles district. Feichtmann replaces Robert McNamara who has been transferred to the Graphic Arts Division of the company and promoted to assistant division manager. Feichtmann has been a sales engineer in the Los Angeles office of Western Gear for the past three years. In his new assignment he will have responsibility for the sales of gearmotors, speed reducers, high speed units, pump drives and other mechanical power transmission products produced by the Industrial Products Division. Charles C. Harshberger, formerly Portland district sales manager, has been transferred to Seattle district headquarters. Fred Hearing, formerly sales engineer in the Seattle office, has been transferred to Portland and promoted to sales manager for that district, replacing Harshberger. Harshberger will serve the Seattle district area as Sales Manager. A veteran of ten years with Western Gear, Harshberger will promote sales of the company's gear motors, speed reducers, high speed units as well as custom designed machinery for the lumber, pulp and paper industries. Hearing holds similar sales responsibilities in the Portland district.

Indicator For Very Low Flows

For flows down to 0.075 gpm (water) and ½ cfm (air or gas), a new reliable indicator is said to show at a glance whether flow is taking place. Visible from a distance, even in bad light, the flow makes a ball dance in the toughened glass dome. If the flow stops, the ball drops out of sight. Useful in applications such as air, steam, water, and oil purge lines to instruments and mechanical seals; cooling water to diesel engines, compressors, condensers, jacketed process vessels, laboratory equipment, and electronic equipment; lubricating oil to bearings; and many others. The new Arkon "Ball Type" flow indicator is made in ½" pipe size for pressures up to 100 psi with die-cast bronze body, and either Nylon or Teflon ball. It has only one moving part. Information on the indicator is available from McIntosh Equipment Corp., Walker, Crosweller Div., 15 Park Row, New York 38, N. Y. (ITS NEW)

New Fuel Tank Valve

An economical new selector valve that permits the truck driver to switch from one fuel tank to another by means of a control on the dashboard has been announced by the Anderson Brass Co., Detroit, Mich. The new valve utilizes a simple positive-mechanical action which, according to the manufacturer, assures controlled port actuation at all times preventing draining or pumping from one tank to another, and eliminating aeration of fuel by sucking air from the empty tank. The valve can be used in pairs for installations requiring three or four tanks, and is adaptable to recirculating fuel tank systems. (ITS NEW)

EMD Branch Manager

Appointment of J. I. Bocinsky as manager of the North Salt Lake, Utah, Branch of Electro-Motive Division of General Motors is announced by R. A. Stoddart, director of branch operations. Bocinsky succeeds the late J. S. Chisholm. He joined Electro-Motive in September of 1938 and in May of 1954 was made plant superintendent of the North Salt Lake, Utah, Branch.

Electronic Sensing Control

Extensively redesigned and broadened in its applications, the new Security electronic sensing control recognizes metallic and nonmetallic objects, without physical contact, as they enter a capacity field, reports the manufacturer. Designated as model 400, it is recommended where switches are impracticable. Consisting of a sensing element or probe (of any form or size) connected by coaxial cable to the electronic control, the device can be set up to any given constant at a given time interval. The control is available in chassis form for panel mounting or in a key-locked, shock-mounted and gasketed cabinet. Detection is expressed in numerous ways, such as stopping a machine, actuating a rejecting or correcting device (via plus-minus relays) or signaling for action by an attendant, states the manufacturer. Uses blanket virtually every industry, claims Security Controls. Examples include indicating changes in liquids flowing through pipeline checking suitability of diesel engine fuel oil to determine necessity of changing; actuating solenoids, correcting or rejecting mechanisms, counters, audible or visual signals. Information and literature are available from Security Controls, Inc., 503 Franklin St., Buffalo 2, N.Y.

(ITS NEW)

New Chief Engineer

Norman J. Smith has been named chief engineer of the instrument division of J. E. Lonergan Co., it has been announced. Mr. Smith is well known in the instrument field and has been issued 32 patents pertaining to instruments and gauges. Prior to his new appointment, he was a research scientist in computor and associated equipment design for the Philco Corp. Mr. Smith's primary function in his new position will be the design of new products called for by the company's planned expansion.

Harbormaster Marine Tractor

TOUGH POWER and STEERING JOBS ARE EASY FOR THIS WORK HORSE!

Solve tough power and steering requirements with Harbormaster Marine Tractors. Harbormasters are complete, heavy duty outboard propulsion and steering units, *all in one quickly and easily installed package.* They are efficient and economical to operate and they offer many special features not found with ordinary marine power.

If you want easily installed power, better steering control, safety in shallow water, easier maintenance, more efficient performance, simpler hull design, more cargo space, or simplified crew operation . . . then it will be worth your while to investigate Harbormaster Marine Tractors.

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Please send me New Catalog giving details and showing many photos of Harbormasters in action.

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Pressure-Lock Filter Elements

A new folder from Purolator Products, Inc., describes a new type of hydraulic and pneumatic filter element said to be free of "built-in" contaminants and lighter in weight. The folder details information on the pressure-locking process in which end caps, center tube, and filter medium are mechanically locked under high pressure, locking the filter element in the parent metal of the end caps to form a leak-proof seal, eliminating contamination possible from oxidation products and flux normally encountered in conventional joining processes and making it possible to fully utilize the inherent operational features of filter construction materials. Specifications for five types of elements covering rated flow capacities of 0.5, 3, 6, 12, and 24 gpm plus details on degree of filtration, temperature range, construction materials, fluids, and minimum collapse pressure are included in the new folder. For copies of the new Pressure Lock Filter Element folder, write: Department 132, Purolator Products, Inc., Rahway, New Jersey.

ITS NEW

Peterson Marine Representative

Appointment of Glen W. Bickley as a marine engine sales represenative was recently announced by Howard Peterson, president of Peterson Tractor Co., Northern California dealer for Caterpillar Tractor Co. Mr. Bickley, a graduate in mechanical engineering at the University of Minnesota, was formerly with the product research department of Caterpillar Tractor Co. before joining Peterson's a year ago.

Fiat Engine BMEP is 20.3

In a story describing a Fiat Marine engine in our December, 1959 issue the bmep of the engine at 127 rpm should have read 20.3 lbs./sq. cm. instead of the 29.3 lbs. listed.

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New Drydocks For St. Louis Ship

St. Louis Ship recently built two new drydocks as an addition to their repair facilities. The two 850 ton capacity docks replace one 1,000 ton dock. The docks are 75 ft. long, 75 ft. wide and 23 ft. high with 65 ft. clearance between wings. They can be used separately providing additional drydock facilities for normal lifts, or can be operated together for lifts up to 1,700 tons. The hulls are of all welded steel construction and are each divided into 24 compartments. To speed docking time, each dock is equipped with two Fairbanks-Morse 2500 G.P.M. electrically driven vertical propeller pumps, making it possible to sink the dock, position the boat or barge, and raise the load in less than an hour. Mercury Vapor lamps give the docks excellent light for night work. Welding machines are mounted on the wings for work convenience and efficiency.

New Diesel Fuel Additive

The Shaler Co., announced they are now manufacturing and distributing Shaler Diesel Fuel Additive, a new product available in pint and gal. cans, and 5, 15, 30 and 50 gal. drums. A Shaler spokesman stated that the diesel fuel additive is specially formulated as a detergent, dispersant and solvent to aid in eliminating and preventing sludge formations, gum and varnish in the fuel supply line. The new additive's penetrating action is said to aid in keeping injectors and moving parts clean, giving more complete, cleaner combustion and better starting for all types of diesel engines.

ITS NEW

Oil Field Sales Engineer

In a move toward expansion of sales and service to the oil fields for Power Chief diesel and gas engines, the appointment of Don G. Rhoads as Sales Engineer, oil field sales, was announced by R. W. Bayerlein, Vice President Engine Division, Nordberg Manufacturing Co., of Milwaukee. Mr. Rhoads will work with distributors and users of Nordberg Power Chief Engines on production pumping and water flooding applications. Presently located in Wichita, Kansas, he will eventually headquarter in Tulsa, Oklahoma and serve the entire mid-continent oil field area.

Dynamaster Laboratory Recorder

The Bristol Co. is now offering a new laboratory model of its Dynamaster potentiometer recorder. Basically, the instrument is a wide-strip recording instrument especially adapted to laboratory requirements. The new multi-purpose recorder lends itself readily to measuring such variables as pressure, temperature, motion, flow, density, pH, and electric power. Special input signal selection switches and span adjustments provide maximum flexibility. The four-position input selector switch provides for millivolt, volt, microampere, or milliampere input. The five-position span selector offers ranges 0-2, 0-5, 0-10, 0-25, and 0-50. An alternate span continuously adjustable from 0-2 to 0-50 is available. For further information write The Bristol Co., Waterbury 20, Conn.

ITS NEW

Earthmover Catalog

A reference catalog on Caterpillar earthmoving equipment and its diesel engines has been released by Caterpillar Tractor Co. The 20-page, two-color booklet is titled "Caterpillar Construction Equipment." The brochure contains model views and brief specifications of motor graders, track-type tractors, bulldozers, rippers, Traxcavators, crawler-drawn scrapers, wheel tractors, scrapers and wagons; pipelayers, controls, industrial engines, electric sets, marine engines and auxiliary equipment. The catalog may be obtained by writing to the Advertising Division, Caterpillar Tractor Co., Peoria, Ill., and requesting Form D942.

ITS NEW

Perkins Expansion Program

A £285,000 extension plan is announced by F. Perkins Ltd., the Peterborough diesel engine company, to effect a major reorganization of the main factory. It will include the erection of three extra bays at the company's Eastfield factory, which employs 6,000 people. The plan is linked with a development scheme, involving additional plant, equipment and material handling facilities. Work is to start soon and will be completed by the middle of 1960. Mr. M. I. Prichard, managing director of F. Perkins Ltd., stated "Our peak production this year will be more than 400 engines a day, but this figure will rise to 700 engines a day next year." Earlier it was announced that Perkins Engines Ltd.'s European zone had been divided into two because of increased sales. Explaining the extension plan, Mr. G. E. Smith, F. Perkins Ltd.'s director of production, stated that two new bays to be built at the south end of the factory would be used for storing components and finished engines. The third bay would be utilized for transport and handling purposes.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

Turbine Pipeline Compressors

The first unit of a new line of gas turbine-driven centrifugal gas compressors designed and developed by Solar Aircraft Co. has been ordered by Trunkline Gas Co. for installation in a natural gas pipeline compressor station, according to France Q. Wilson, manager of turbine and control sales. The new compressors, which are applicable to field compression as well as main pipeline stations, will operate from 75 to 1000 inlet cfm at up to 1500 lbs. of pressure, he said. The Trunkline compressor will be driven by a Solar Saturn T-1000 gas turbine engine, which produces 1100 hp. Total weight of the compressor and engine will be approximately 5000 lbs. "Solar's line of compressors is designed for high rotating speeds from 15,000 to 30,000 rpm to match the rotating speeds of the gas turbine driver," he added. "This allows the direct coupling of the compressor and the turbine." Higher compressor speeds allow use of centrifugal compressors in the area from 75 to 1000 inlet cfm.

Filter Line Catalog

"Complete Filtration for Liquids and Gases", a new eight-page catalog, gives a brief description of each of the products in the CFC line of filtration equipment. The line includes filters for continuous micro-clarity of all types of industrial fluids, chemicals, gases, oils, and water. Information is classified according to applications, operating pressures, and sizes. In addition to the filters, various types of filter media are described and illustrated. Copies are available from Commercial Filters Corp., 2 Main Street, Melrose, Mass. Ask for GEO-506A. (ITS NEW)

Fairbanks, Morse to Build Units for Nuclear Sub Tenders

Fairbanks, Morse & Co. has been awarded the contract to build the propulsion engines and electric generator sets of the United States Navy tender for the "Polaris" type nuclear-operated submarines, it was announced today by Frank M. Mason, Jr., vice president for government operations. The tender, a new type of ship which is being constructed by the Newport News Shipping and Drydock Co., is a kind of sea-going machine-shop which will take care of as many as six nuclear-powered submarines. Ten Fairbanks-Morse diesel engines are to be supplied under the contract. Six of the engines are 10 cylinder supercharged opposed-piston diesels, and four of them are non-supercharged OP diesels. They are to provide 12,000 kw of ac diesel propulsion power, plus 3,000 kw of power for ship service auxiliary. The engines and generator sets will be built at Fairbanks-Morse's heavy machinery plant in Beloit, Wis. For the United States Navy, Fairbanks-Morse is also building the auxiliary generator sets for Polaris class submarines, and for 10 guided-missile frigates of DLG-16 class.

Navy Electric Manual

A U. S. Navy Bureau of Yards and Docks engineering manual on electric power generation and distribution has been published for sale to the public by the Office of Technical Services, U. S. Department of Commerce. Power Generation And Distribution, Chapter 2 gives the specifications and outlines maintenance and operation of emergency power plants, emergency electric generator equipment, steam railway power plants, and mobile and portable diesel-electric generating plants. Included in the equipment discussed are a portable diesel-electric 600 kw generating plant (heavyweight) and a 600 kw portable diesel engine-driven generating set (lightweight). Order PB 161056 from OTS, U.S. Department of Commerce, Washington 25, D.C. at $1.75 a copy.

Advanced Design Chief

Appointment of Arthur F. Erwin as chief of advanced design, Defense Products Division, has been announced by Allis-Chalmers. Since joining the firm in 1935, Erwin has served Allis-Chalmers successively as assistant manager of the defense contract department, secretary of the development and new products committee, assistant manager of the nuclear power department, and most recently engineer-in-charge of the nuclear pump section.

Service Firm Promotions

Six additions to the executive personnel of Cummins Service and Sales, Los Angeles, Calif., plus several promotions and other realignment of duties, have been announced by S. B. Cook, vice president. J. R. Neal has disposed of his interest in the Arizona Cummins distributorship to return to Cummins Service & Sales as manager, Plant Operations. He is widely known in the trucking industry in the West, having held executive positions with Cummins Service & Sales for 10 years before his move to Phoenix in August 1958. Mark Ogden resigned as sales manager for a San Diego manufacturer to return to Cummins Service & Sales as sales promotion manager. E. M. Womble, active in the diesel engine industry since 1938, has been promoted to manager, Industrial Sales. Marshall McMillan rejoined the company as application engineer after an absence of 2½ years,—spent as a Twin Disc Clutch Co., sales engineer. Earlier additions to the staff were appointment of Thomas W. Shenk, formerly of the Chicago regional office of Cummins Engine Co., as manager, Dealer Accounts, and the employment of Richard D. McGuckin as an engine salesman. LaVerne Morgan becomes manager, Technical Service, and E. M. Power, becomes manager, Parts Sales. C. H. Engel was promoted from maintenance advisor to shop superintendent.

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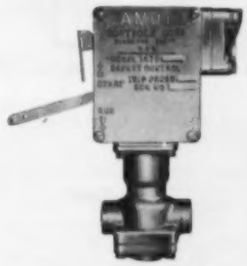

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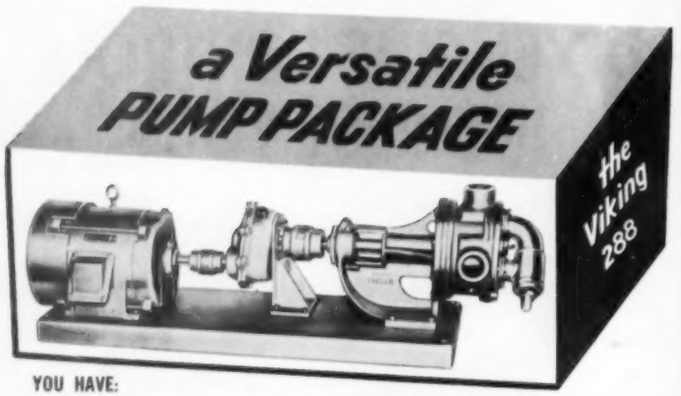

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See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File

Perkins Engines in Lifeboats

Two new unsinkable lifeboats planned by the British Royal National Lifeboat Institution are to be fitted with Perkins four cylinder diesel engines. The R.N.L.I. has ordered four Perkins P4 engines for the 37 ft. self-righting lifeboats, which will cost a total of £46,000. Twin engines, each developing 43 bhp at 2,000 rpm an dwith 2:1 reduction gears, will give the boats a speed of eight knots and a range of approximately 110 nautical miles. In 1957, Perkins supplied two of these engines for the "prototype" of the new boats. This lifeboat, the result of five years' design work by R.N.L.I. experts, is now in service at Scarborough.

Lake Shore combines its Generator Control with the Trans-O-Matic Dual Circuit Breaker Transfer Switch and offers you optional choice of Engine Start Control and Battery Charger in one compact, rugged control center. You gain extra space . . . and enjoy savings of 20% or more under the cost of separate controls.

Available for D.C. and A.C. service, single and 3-phase to 800 amps., 600V.

*Engine Start and Battery Charger optional.

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New Equipment Division

Allis-Chalmers' Manufacturing Co. has combined its Industrial and General Products Divisions into a new operating unit called the Industrial Equipment Division, with W. M. Wallace, a vice-president and general manager of the new division. G. A. Saar was appointed assistant general manager. The new division includes the Compressor, Processing Machinery, Centrifugal Pump, Control, and the Industrial Systems departments, plus the Norwood Works, motor and pump manufacturing facility. Canadian Allis-Chalmers formerly a part of the Industrial Equipment Division, will now operate as a separate division of the Industries Group. H. M. Schudt, president of Canadian Allis-Chalmers is divisional general manager. Mr. Wallace was named assistant manager of the Power department in 1954 and in November of the same year was named manager of the Processing Machinery department. He became general manager of the General Products Division in 1955, and was elected a vice-president in 1957. Prior to his appointment as assistant general manager, Mr. Saar was assistant to the senior vice-president. Previously, he had been manager of the Norwood (Ohio) Works Electrical department, holding that position since 1955. Mr. Schudt joined Allis-Chalmers in 1929 and in 1954 was promoted to the position of assistant to the Tractor Group's vice-president and director of engineering. The following year, as president of Canadian operations, he took charge of operations which include manufacturing plants at Lachine and St. Thomas (Ont.) and sales offices in major Canadian cities.

Engine Maintenance Brochure

A new 24 page booklet on diesel engine maintenance has been prepared by Cummins Engine Co. The booklet, "Ten Maintenance Steps," tells power users how to increase equipment availability, reduce operating costs and obtain better engine performance. A free copy of the booklet may be obtained by writing the Sales Services Department, Cummins Engine Co., Inc., Columbus, Indiana.

ITS NEW

Dredges for Buenos Aires

Negotiations for design and construction of dredging equipment totaling approximately $500,000 have been completed by the Ellicott Machine Corp., Baltimore, with the Ministry of Public Works of the province of Buenos Aires, Argentina. The contract includes delivery of five 12-in. hydraulic dredges specifically designed for working in canals and other narrow waterways. Powered by a 228 hp diesel engine, each unit can dig to a depth of 16 ft. The units will be employed in an extensive canal construction and maintenance program in the delta of the Parana River in the vicinity of Buenos Aires. Improvement of the waterways will lessen the possibility of floods and provide adequate drainage for the delta.

Changed Management 'Climate' Seen Aiding Automatic Control

A management climate "favorable" to automatic control is viewed by a Minneapolis-Honeywell Regulator Co. official as opening up vast opportunities for instrumentation specialists to contribute to the growth of their companies. "Management is taking a more attentive, if not more aggressive, position with respect to automatic control," George M. Muschamp, engineering vice president of Honeywell's Industrial Products Group, told the New York section of the Instrument Society of America. "Management has seen ample demonstration, not only in the plant but also in the office and in the laboratory, of what automatic aids can do. Furthermore, the bogey of labor opposition has been thoroughly discredited if not eliminated." This means, he said, that programs once difficult to justify may now be more readily accepted by management. "The scope of automatic control problems is constantly widening and thus taking the problems and decisions higher and higher and therefore closer and closer to top management," he continued. If instrument groups can exercise control in specifying systems, Muschamp said, "they will be doing their employers a great service." "It ought to be possible in every case for a systems or instrument group to work out a joint arrangement with the operating groups so that the operating group would undertake such jobs with the same enthusiasm and tenacity as if the ideas were their own," he said. While automatic control offers challenges to user organizations, it also confronts instrument manufacturers with the same challenges, he continued. "We have to face a spectrum of apparatus and system situations varying from a simple thermocouple through the various temperature, pressure, flow and many other indicating, recording and controlling instruments to the complex data handling systems, analog computers and now the sophisticated digital computers," he explained. "This would be challenge enough if it involved only the supply of equipment, but much more is involved. Basic to this challenge is the provision of suitable system engineering so as to insure the proper integration of this infinitely complex mass of equipment in economically and technically sound systems as opposed to mere aggregations of equipment."

Awarded Guild Status

After qualifying for membership in GM Diesel's service craftsman's guild, eight members of the service staff of King-McIver, Inc., of Greensboro, were honored at an awards dinner recently at the Plantation Supper Club. The guild is a national organization newly established by the GM Division to recognize and encourage expert workmanship in the proper servicing and maintenance of GM Diesel engines. Qualifying for membership were: Kelly Gilbreath, Robbert Gilbreath, Jack Hazelwood, Ralph Kirkman, Charles Knowles, Irvin Lewis, Robert Woodward, and H. H. Rockett, King-McIver's service manager.

Kohler Diesel-Electric Booklet

A new eight page booklet announcing the new Kohler Trio, a series of diesel-electric plants, has been published by Kohler Co., Kohler, Wis. The new 2000, 5000, and 7500 watt diesel-electric plants were engineered for the construction, marine, railroad, and industrial markets. Copies of the booklet are available by writing: Diesel Trio, Kohler Co., Kohler, Wis. (ITS NEW)

New Fleet Engineer

Perfect Circle Corp. announced promotion of district manager William C. Schuster to fleet engineer. Mr. Schuster has been representing Perfect Circle out of Louisville, Ky. His new territory will include Pennsylvania, New York, New Jersey, Virginia, the Carolinas, Georgia, Florida, Alabama, Maryland and the New England states.

Gleaner-Baldwin Combine

Allis-Chalmers has added the Gleaner-Baldwin model AH hillside combine to its harvester line produced at the Independence (Mo.) Works. The new combine, available with 14 ft. header, features effective self-leveling on rolling terrain for safe and comfortable operation. A double mercury switch actuates the hydraulic leveling system. Power to operate the leveling rams is provided by a hydraulic pump, V-belt driven from the rear of the engine crankshaft. The 2 gallon capacity reservoir is located under the operator's seat. The new Gleaner Model AH has a two-fan cleaning system to assure cleaner samples in the bin. The new Gleaner combine is powered by Allis-Chalmers' D262 6-cylinder diesel engine. The final drive is a planetary gear type for more positive traction. Standard equipment includes power steering, lights, individual multiple disc self-energizing hydraulic brakes, and header with hydraulic-operated reel.

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Moline M-5 Tractors

A new 1960 model M-5 tractor has been introduced by Minneapolis-Moline. First in a new series of tractors in the 60 to 70 hp class, the M-5 gives access to all controls in a "comfort control zone" centered on the driver's platform. The 336 cu. in. Moline-built four- cylinder diesel engine, at normal governed speed of 1500 rpm, develop 69 brake hp, 59 belt hp and 54 drawbar hp. Engine, transmission and axle are designed and built by Moline to form a heavy-duty coordinated unit. Moline's "Tel-O-Flo" hydraulic system, with single or double-acting cylinders, controls mounted or remote tools. The engine is equipped with American Bosch PSB fuel injection pump, Donaldson air cleaners, Fram fuel filters, Wix lube oil filters and Rockford clutch.

Cooper-Bessemer Sales Appointments

Several appointments in sales offices of the Cooper-Bessemer Corp., Mount Vernon, Ohio, have been announced. R. M. Boone has been transferred to the Odessa, Tex., branch office and David James has been transferred to the Dallas office. Named to the New York office is Richard H. Van Bergen while Owen T. Tolson has been assigned to the Shreveport, La., office. William R. Buchanan was assigned to the office at Caracas, Venezuela. All the men were previously assigned to the company's home offices.

Named to Sales Post

Griffin Equipment Corp., New York City and Lodi, N.J., distributors for the Allison Division of General Motors Corp., has appointed Robert B. Poorman sales manager in charge of its transmission and converter operation.

Foreign Sales Assistant

Appointment of Robert M. Johnson as assistant manager of its foreign sales division has been announced by officials of Fuller Co. Mr. Johnson will assume his new duties immediately. An administrative assistant within the Fuller organization for the past ten years, Johnson will be responsible for coordination of foreign sales effort in his new post.

New Western Division Manager

William Hyland has been named western sales manager for Van Norman Machine Co., a division of Van Norman Industries, Inc. Mr. Hyland will make his headquarters at Machinery Sales Co., Los Angeles 5, Calif. In his new position, he will be responsible for sales and service on the West Coast.

READY SOON! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG,** Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 450 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just $10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG,** 9110 Sunset Blvd., Los Angeles 46, Calif.

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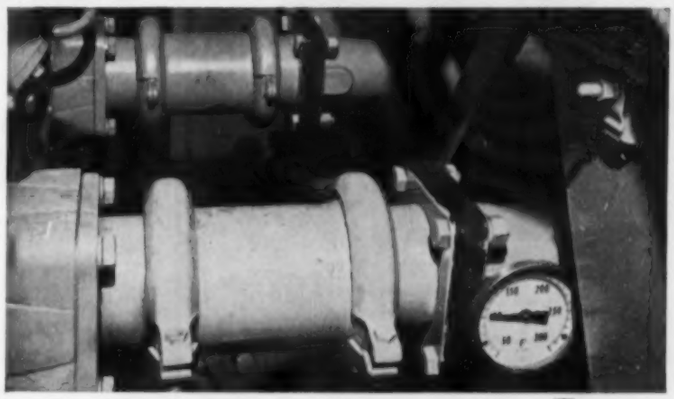

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• Corrosion Resistant

The Marman 53000 Series FLEXMASTER Pipe Assembly is designed for diesel lube and hot water lines that require frequent disconnection for engine maintenance. The 4-bolt flange ends easily install on engine components. To disconnect piping, the FLEXMASTER uncouples quickly with the removal of two bolts.

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Series 6500 FLEXMASTER Pipe Coupling connects pipe ends without threading.

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ENGINEER'S FIELD REPORT

RPM DELO Special Oil protects so well... trucks work 25% longer before overhaul

Wagner Transportation Co., Twin Falls, Idaho, used to schedule engine overhauls for its over-the-road diesel tractors at 200,000 miles. After changing to RPM DELO Special Oil, however, engines dismantled at this interval showed so little wear . . . were in such good condition throughout . . . that overhaul period was extended to 250,000 miles.

"RPM DELO Special Oil does the best job of any oil we've ever used," says Wagner's Master Mechanic, Ike Rile. "We've used it since 1952 . . . have yet to find a stuck ring. It holds down engine wear, eliminates sludge and varnish...oil consumption is moderate, too! We've tried competitive oils but in our opinion there's no comparison."

Hauling livestock, produce and general freight, Wagner Transportation Co. rigs operate throughout the West in every sort of temperature extreme . . . travel close to 2½ million miles per year. Present fleet includes 10 Whites and 10 Kenworths.

RPM DELO Oil reduces wear and prolongs engine life because it clings to parts whether the engine is running or idle . . . hot or cold. Piston rings stay free because an anti-oxidant fights gum and lacquer formation and a special detergent keeps parts clean. Other additives prevent corrosion of bearing metal and crankcase foaming.

Why not try RPM DELO Oil? Chances are it can cut your costs, lengthen equipment life. Just call your local representative or write any company listed below:

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Report from Black Ball Transport...

MV Coho. Designers: Philip F. Spaulding & Associates. Builders: Puget Sound Bridge & Dry Dock Company. Owners: Black Ball Transport, Inc.

Left to right: P. F. Spaulding, Naval Architect; R. J. Acheson, President, Black Ball Transport, Inc.; H. W. McCurdy, Puget Sound Bridge & Dry Dock Co.

How Cooper-Bessemer powered MV Coho passed her sea trials with flying colors

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The *MV Coho* is powered by two Cooper-Bessemer LS-8 DRT diesels, each rated 2080 bhp at 300 rpm. These four-cycle turbocharged engines are matched right and left hand, direct reversing and direct connected to their propulsion shafts. They run on residual fuel.

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